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IN THIS ISSUE

IN "Mental Hygiene and Socio-Environmental Factors," R. H. Felix, Medical Director and Chief, and R. V. Bowers, Social Science Research Consultant, of the Mental Hygiene Division, U. S. Public Health Service, present a review of the present status of our knowledge on the relation of environmental factors to mental health and mental disorders and discuss various types of research which are much needed to furnish basic information for the improvement of preventive and therapeutic measures. This is the fourth in a series of papers from a Round Table on Backgrounds of Social Medicine which was part of the 1947 Annual Conference of the Milbank Memorial Fund.

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The program of medical and other health services developed in New Zealand during the past ten years is being watched with interest by many persons in this country and elsewhere. Under the Social Security Act of 1938, the state pays for medical, pharmaceutical, hospital, and some other services which are available to every citizen of New Zealand without means test of any kind. Such a service is unique and is, in a sense, an "experiment" in a social field in which complex and difficult problems are pressing for a solution. A report on the program and its operation, written by Hugh MacLean, M.D., and Dean E. McHenry, Ph.D., is published in the following pages under the title "Medical Services in New Zealand." As a fellow of the Carnegie Corporation, Dr. McHenry spent a year in New Zealand on sabbatical leave from the University of California in Los Angeles, where he is Associate Professor of Political Science and Dean of Social Sciences; and Dr. MacLean, a phy-

sician and surgeon now in Los Angeles who formerly practiced in Saskatchewan, Canada, also spent several months in New Zealand on their study of health services under the Social Security Act. The expressed purpose of the authors is to produce an objective survey and appraisal of the New Zealand health program. The authors are entirely responsible for the facts given in their report and the opinions expressed do not necessarily represent those of the editors of the *Quarterly*.

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The series of articles appearing under the general title "Social and Psychological Factors Affecting Fertility" is continued in this issue. These studies are based upon a large amount of data collected in Indianapolis from a group of native-white couples meeting specific requirements for the Study. In the eighth article of the series, "The Comparative Influence on Fertility of Contraception and Impairments of Fecundity," P. K. Whelpton and Clyde V. Kiser present estimates of the relative importance of voluntary and involuntary factors in accounting for the differences between (a) the observed fertility levels of the group, and (b) the computed maximum fertility of the group if no contraception were practiced and if all couples were "normal or above" in fecundity. The authors also estimate the relative influence of voluntary and involuntary factors in childlessness.

MENTAL HYGIENE AND SOCIO-ENVIRONMENTAL FACTORS

R. H. FELIX, M.D., AND R. V. BOWERS, PH.D.¹

INTRODUCTION

THE subject of this paper is one that has come increasingly and compellingly to the attention of psychiatrists and other students of human behavior in recent years. The impact of the social environment on the life history, and the relevance of the life history to mental illness, are no longer in serious question as clinical and research findings. But, even though we have come a considerable distance in our systematic understanding of the symptomology and psycho-dynamics of mental disorders, such understanding does not extend to any extent the role played by socio-environmental factors.

The growing recognition of the seriousness of this gap for the etiology and treatment of mental disorders serves also to point to its seriousness for case-finding and prevention, equally important segments of a national mental hygiene program. Thus it seems well to attempt to define the dimensions of the problem, survey its present research status and outline some important areas of needed research for the future. In so doing, we shall also be defining the role of social science in the mental hygiene movement, a matter too long postponed for the benefit of each.

By mental hygiene we shall mean the knowledge and skills requisite to reduce mental disorders and maintain mental health. These will be specified in more detail shortly when we place the problem in its full epidemiological context. However, at this point it should be made clear that mental hygiene must be concerned with more than the psychoses and with more than hospitalized mental illness. In fact, its great problems are the ambulatory ill and the pre-ambulatory ill (those whose probability of breakdown is high). The appropriations for state aid

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under the National Mental Health Act are entirely for such out-patient and preventive work.

By socio-environmental we shall mean anything that is a product of group life. As such it includes the cultural heritage—the knowledge, attitudes, and behavior patterns acquired through living with others—as well as the network of groups through which the cultural heritage is transmitted and living is effected. It includes not only the consistencies and satisfactions of this way of life but also its inconsistencies and deprivations. It includes not only this way of life as it is found in others but also as internalized within the mentally disordered person himself.

Research in the relations between such socio-environmental factors and mental hygiene is, of course, a part of the larger research problem of the epidemiology of mental disorders, and epidemiology, as Emerson once said, is “whatever affects or bears upon the incidence of disease among the people.” (1) This means that case-finding procedures must be available to determine incidence, and knowledge must be available as to what affects or bears upon such incidence. This latter is of two main varieties: (a) knowledge of etiology, that is, how people acquire the disorder; and (b) knowledge of methods to combat the disorder, that is, therapeutic skills for those who are sick and preventive techniques for those who are still well.

Socio-environmental factors are of possible importance in each of these four epidemiological areas: in case-finding, in etiology, in treatment, and in prevention. The problem is to determine whether in fact they are important, and to what extent. In this brief paper we shall not have time to review the existing literature in detail, but shall concern ourselves with the general argument of the studies and their limitations for a well-rounded epidemiology. Then we shall suggest certain lines of epidemiological research that must be developed in the future if a mental health program is to be maximally effective.

PRESENT RESEARCH STATUS

The Incidence Problem. Case-finding in mental hygiene has

remained a poorly exploited research field. Most studies of prevalence or incidence have been confined to hospitalized psychotics, usually patients of public hospitals, although there have been attempts to go beyond this, notably, nationally conducted censuses, the draft and armed forces data from the two world wars, and occasional studies of population samples.

With reference to the censuses, Lemkau, Tietze, and Cooper in a recent report state the general conclusion that "such attempts have been generally unsuccessful because of widespread failure on the part of informants and enumerators to recognize or report any but the most obvious cases." (2) With reference to studies of sample populations, they report that "poor selection of sample populations and insufficient numbers of cases as well as differences in investigation methods, differences in fundamental concepts, and differences in diagnosis and classification tend to make the available studies of prevalence and incidence of mental disorder basically incomparable." (3)

World War II draft and armed forces' medical data will, when available, provide psychiatric information on a larger proportion of the population than has ever before been provided. However, it must be remembered that these millions of medical records constitute a special population group in men who were determined by law and Selective Service regulations to be non-deferrable and hence available for military service. Moreover, the number of socio-environmental factors available on these tabulations will be few indeed.

Finally, the large number of prevalence and incidence studies of hospitalized psychotics are inadequate for our purposes on many counts. First of all, they deal with only one part of our problem, the seriously ill. Secondly, they deal only with that portion of the seriously ill which becomes hospitalized. Third, they can deal only with those socio-environmental factors which are included on hospital records. The studies are in no sense carefully designed experiments to explore relationships or test hypotheses by means of original data. The researchers have no control over the case-finding process, over the record keeping,

or even the diagnosis. Rather, they are dependent upon the public's uneven willingness to give up its mentally ill members and to support them in institutions, the hospitals' unstandardized record-keeping activities, and the hospital staffs' varied training and skill in classifying disorders. Finally, the studies have not always been made with much perception of sound methodological principles.

They have been confined to describing certain basic population attributes of the hospital population such as age, sex, economic status, residence, marital status, race, nationality, residence, etc. The results show substantial agreement on age, sex, and marital status differentials, (4) some debatable evidence of economic status and ecological differentials, (5) and skepticism with regard to some of the other findings of early studies. For example, early studies showed that there was a higher incidence of psychoses among the foreign born, but, as Malzberg and others have pointed out, the differences were greatly reduced if even one variable—age—was controlled. In the study on New York State institutions, 1929–1931, the crude first admission rate of the foreign born exceeded that of the native born by 96 per cent. With age controls, the excess was reduced to 19 per cent. With residence controls, the excess was reduced to 8 per cent. For males alone, the comparable differentials were 92 per cent, 17 per cent, and 5 per cent, the last being within the range of statistical variability. Thus, Malzberg concludes that “to explain the differences in mental disease between native and foreign born on the basis of biological values is without foundation.” (6) Likewise, the early differences found between urban and rural people were later believed to be, in good part at least, figments of the case-finding and analysis processes. (7)

The most pertinent of these studies from an epidemiological point of view are the so-called ecological ones. The possibility of urban patterns for specific psychoses as originally presented by Faris and Dunham in 1938 provide a lead for case-finding and a basis for correlation with socio-environmental factors worthy of serious attention. (8) A number of similar studies

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have been made in other cities since 1938, (9) and Dunham, in a recent review, summarizes the major agreements as follows: (10)

1. That all types of mental disorder show a pattern of distribution within the city where the high rates are highly concentrated in and around the central business district with the rates declining in every direction toward the periphery.

2. That the schizophrenic rates in different cities show a pattern of distribution which is very similar to that of all types of mental disorder.

3. That the schizophrenic rates form an expected typical pattern with the concentration of the high rates in areas of low economic status while the manic-depressive rates show a much wider scatter within the city and show a lack of conformity to the concentric-circle pattern.

4. That persons residing in areas not primarily populated by persons of their own ethnic or racial groups show much higher rates than those of the numerically dominant group.

The possible value of such studies for case-finding should not be overlooked by those who bring criticisms against the studies' etiological significance. Where the mentally disabled are concentrated is an important case-finding datum in itself. Moreover, how they got there is also important, but whether the process turns out to be "drift" from other areas or gestation within the areas of concentration does not diminish the case-finding value of such areas.

Thus, while statistical studies of prevalence in recent years have been more carefully done and have dispelled some of the inaccurate generalizations of the past, they too have generally suffered under the same methodological handicaps—confinement to hospitalized psychotics and general lack of control over the data used. Regrettably, it must be concluded that the amount of evidence they have produced for the improvement of case-finding is negligible even for psychotics. In the field of neurosis and the milder disorders, pertinent evidence is almost totally lacking.

The Etiology Problem. Research and theorizing concerning the part played by socio-environmental factors in the etiology of mental disorders are scattered through the literature of many scientific disciplines. Furthermore, the literature is fragmentary and presumptive rather than experimentally compelling. But the trend has been twofold: First, to see mental health and mental illness as differing in degree rather than in kind; and, second, to take increasing etiological cognizance of the life history and the socio-environmental context of the life history.

These trends are consistent with the general course of scientific findings regarding human affairs. As the older assumptions of geographic or biological determinism of human behavior have been scrutinized, they have been generally abandoned. It is difficult to believe that not so long ago professional opinion saw delinquency, for example, as the product of climate, heredity, or original sin.

The field of mental disorders is the latest great human problem to yield to this social logic. This is somewhat understandable in that it was defined as a medical field, and the weight of medical training predisposed the doctor to organic hypotheses. But, gradually, evidence has been accumulating within the profession concerning the role of social factors in mental illness, although as Emerson summarized it before the war, "we have incidence rates without any environmental counterparts to our information and we have exquisite vignettes of individual cases without enough of them to paint a picture of the composite." (11)

During this same period considerable coordinate information has been accumulated by the social sciences. Most of it has concerned normal personality development, some has brought new insights to such special types of deviations as demoralization, delinquency, and suicide, and still other has touched directly on mental disorders. Space permits only a cursory review of this literature. (12)

These studies have produced strong presumptive evidence that both the content and the orientation of personality are

powerfully influenced by the social setting, and, in the process, have extended our ideas considerably concerning the variability of personality. The evidence for the cultural determination of ideational patterns and special motor patterns has, of course, long been established. No one can read the cross-cultural evidence without considerable respect for man's ingenuity in creating thought and motor patterns and for the resiliency of the organism in acquiring them and operating through them. (13) The evidence for the group management of emotional or temperamental patterns is more recent, but already many of our supposed facts have been seriously questioned. A study of Samoan adolescence has questioned the supposedly universal physiological impact of puberty on emotional stability. (14) Another study has described significant inter-group differences in the temperamental patterns of men and women. (15) Some primitive people have been noted for their violent aggressiveness coupled with considerable dissociated excitement, while others were characterized by submissiveness and emotional control.

Further evidence has pointed to the widespread presence of certain personality configurations in certain societies or societal sub-groups. For example, paranoidal suspiciousness has been reported as pervading the reaction patterns of one group, whereas another is typified by self-effacing, non-competitive, group-minded patterns, and still another by a passivity in ordinary living combined with violent release on exceptional occasions. (16) Moreover, within the same society, patterned differences have been described for various status components, including such special categories as oldest as compared to younger sons. (17) In all such cases the personality configuration has appeared to be consistent with the pattern of institutions through which the people lived. This has led to a consideration of the possible existence of a basic character or personality structure in each society with variations for class and other status differentials, a field in which several anthropologists and psychiatrists are now working. (18)

Evidence at the same time has been similarly accumulating on the relation between the societal setting and personality disorientation. Early and compelling examples of this are to be found in the impact of Western culture on primitive societies, where the proscribing or decay of key elements of the native culture led to general demoralization, despondency, declining industriousness, increased infertility, compulsive clinging to elements of the traditional culture, etc. The deleterious results were of sufficient dimensions to become of concern to European governments. (19) However, much needs yet to be known concerning the relationship between such cultural disorganization and personality. Demoralization is not the only direction that behavior patterns have taken under such circumstances. Up-risings, nationalistic movements, and messianic cults attest to at least temporary responses people have made; and the differential resiliency of cultures to change has been noted. (20)

Examination of ethnographic literature has also suggested that relatively well-integrated cultures can involve considerable psychological cost and can even precipitate personality disturbances. In some cases there are socially permitted escapes for those who find the cost too high; in others, the individual must bear it or break under its strain. (21)

The effect on personality of such cultural situations—goals difficult to achieve, inconsistent demands, and social change—has been the subject of increasing study in our own society. The highest incidence of certain types of mental disorder, of suicide, of crime and other forms of deviant behavior has been found in areas of high mobility and disorganized community life, with their accompanying anonymity and loneliness, although the specific causal nexus is anything but clear. (22) Important insights into Negro character have been associated with caste position and the inaccessibility of majority group goals. (23) Studies of second-generation immigrants have revealed the tensions incident to living between two social worlds. (24) Studies of industry have shown the deleterious effects of technological change and bad management on workers. (25)

But perhaps the most trenchant psychological analysis has come from studies of the middle class, for this great segment of the population has not only been most intimately identified with the main currents of change in the modern world but is also the one best known to the psychiatric clinician. This is the class most affected by the invidious distinction and conspicuous leisure and consumption of Veblen's famous studies. (26) It is the one most involved in the impoverishment of the family institution as described by Ogburn, (27) and in the aggression-producing and distorting institutional matrix recently described by Parsons. (28) Moreover, such studies as Lynd's *MIDDLE-TOWN*, Warner's *YANKEETOWN*, Horney's *NEUROTIC PERSONALITY OF OUR TIME*, and Fromm's *ESCAPE FROM FREEDOM* provide sociological, clinical and historical dissections of this class which are penetrating and challenging. (29)

Additional clinical support of these general trends in social science research comes from the psychiatric experience of the armed forces during the war. In a recent summary of army experience, Menninger says:

Far more impressive in the adjustment process than the history of maladjustment in the individual or his family, or the personality make-up or the internal psychodynamic stresses, was the force of factors in the environment which supported or disrupted the individual. We learned that maintenance of mental health was largely a function of leadership which included the extremely important element of motivating the man to want to do his job and remain loyal to his associates and his unit. The absence or weakness of those supportive factors in the presence of many excessive stresses seems to account for many of the psychiatric casualties a large number of which undoubtedly occurred in individuals with a minimal predisposition to mental illness. . . . We seemed to learn anew the importance of the group ties in the maintenance of mental health. We were impressed by the fact that an individual who had a strong conviction about his job, even though his was a definite, unstable personality, might make a remarkable achievement against the greatest of stress. (30)

In a study of Naval experience, Braceland confirms this by saying:

It became obvious early in the course of the war that the most important prophylactics against psychiatric casualties in the military forces were proper individual motivation and high morale in the various units and groups. In retrospect these factors grow in importance and one's attention is drawn to the parts that familial and sociological elements play in military psychiatric disorders. (31)

Thus, the field of the relation between personality and socio-environmental factors is providing intriguing insights into the etiology of mental disorders. The possible existence of group character structures, the stresses put on man by changing conditions or by the excessive demands of the culture, the sources of and the effect of loneliness and social isolation, and the techniques and effects of social esteem and social punishment on personality, these and many other problems need careful and continued investigation. The escape mechanisms of men under the stress of living are not always in the personally crippling direction of neurosis. We need to know under what configuration of circumstances this type appears.

The Treatment Problem. The use of socio-environmental factors in treatment is in its earliest stages, but considerable support was given to it by the war when the shortage of traditional treatment facilities forced the use of new methods. Moreover, psychiatrists in the armed forces learned, as stated above, the value of group integration in preventing disorders or reducing their incidence.

The main developments can be subsumed under the term "group therapies," including occupational therapy, group psychotherapy of the usual type, psychodrama, musical therapy, etc. To many psychiatrists, these are considered supplementary to individual treatment, and, in some cases, are still considered make-shifts. However, others see in them tools powerful in their own right. As one sponsor of group methods recently said:

Group psychotherapy is always "group" therapy. It is the group itself that becomes the therapeutic agent as a result of the interaction between the individuals who form the group. It is lack of knowledge of the dynamics of the group that at present limits the extent of this new therapeutic procedure. (32)

In recent years group psychotherapies have been experimented with in hospitals, out-patient clinics, and other settings, both singly and in combination. Such questions as the role of the therapist-leader, the type of discussion group, the value of rehearsed, filmed, or unrehearsed psychodrama, the effect of playing one's own role or its opposite are among the many under study. The field needs careful study so that its special areas of therapeutic competence will be known and its rationale better established. In some phases of this research, social scientists should have an important place. Their knowledge of group dynamics gained through long study of normal and experimental groups will provide contexts and insights not available to the clinician.

A final note should be added concerning the primarily lay movements which have developed recently. Alcoholics Anonymous is, of course, the best known and has apparently utilized group dynamics with some success in a field that has been very difficult to handle psychiatrically. Another such experiment, Recovery Incorporated, is composed of posthospitalized mental patients and psychoneurotics. Through group discussion and group psychotherapy sessions, and with a hierarchy of persons ready to help those in distress, considerable success is reported. (33) Such developments need study and evaluation. The lessons to be learned from them may be of great usefulness in a national mental health program.

The Prevention Problem. This field of epidemiological activity is the least developed professionally. The efforts so far have been confined to sporadic experiments in education, and sporadic community rehabilitation programs.

In the field of mental health education, national, state, and county committees on mental hygiene, and private groups, have

carried on various programs, but since no intensive evaluation of them has been made, it is difficult to appraise their success. The State Committee on Mental Hygiene in Louisiana has recently initiated a pamphlet series to be sent to new mothers, and the State Committee in Delaware has developed a pamphlet series to be used in the school system. These should be evaluated so that the experience can be made available to other states.

In some communities psychiatrists, social workers, school counsellors, ministers, character-building-agency officials, and others are beginning to form a loose team to teach each other more about the mental health needs of the community and procedures for spotting the problem cases in their early stages.

The counselling services provided by many school systems and industrial organizations is, likewise, a movement that is spreading and has the great advantage of being institutionally centered and close to the people. What these accomplish should be the subject of serious study.

Among the many other developments which might be mentioned, the following are selected because they represent community participation to a peculiar extent.

The first is the Peckham "Pioneer Health Center" project in London. This was established as a family-centered institution, in which periodic health overhaul was accompanied by family health consultations (since, on their theory, the family rather than the individual was the real unit of education), and was also accompanied by self-help recreational opportunities for all members of the family (since, also, on their theory, the integration of the family was of great importance for health). The staff of the Center concludes that the "functional efficiency of individuals increased when their families began to be integrated into the social life around them in the Center," and claim "that integration of the family, developing in mutual synthesis with its environment, will prove to be the biologically economic way of developing human potentiality—the way of health." (34) Such clinical evidence on the importance of social relations for

both physical and mental health warrants careful attention. Its implications are well stated by the medical director of the Peckham experiment: "We can now visualize the essential elements of a technique for the practice of health as something different and distinct from the practice of medicine."

The other is a non-medical movement, the development of what Alinsky calls "People's Organizations." (35) These are organizations of the people in depressed areas to do something about their problems. The first and best known is the "Back of the Yards Neighborhood Council" established in the Chicago stock yards area in 1940 and composed now of representatives from some 185 organizations including churches, schools, business, labor unions, etc. Problems of infant mortality, under-nourishment, delinquency, inter-group conflict, playgrounds, labor relations, and household finance, among others, have been tackled on a community-participation basis. Important results are claimed not only in these matters but also in increased self respect and a sense of belonging. (36) The potentiality of such non-medical community reconstruction in communities known to be high in mental disorders, disease, crime, suicide, etc., would seem to be worth serious study for an epidemiology of mental illness. If the disintegration of community life is accompanied by an increase in the incidence of mental disorders, the reintegration of community life would seem to offer the possibility of reducing that incidence.

SUGGESTED RESEARCH FOR THE FUTURE

The above brief summary of 'where we are' spotlights the conclusion that we have a long way to go before there is a satisfactory epidemiology of mental disorders, and, specifically, before the role of socio-environmental factors is understood. The problem is, "Where do we go from here?"

It is obvious that we need to know more about each of the four problems discussed above. We need more knowledge of the extent of mental disorders, and of their etiology, treatment, and prevention. Moreover, the present situation is most favorable to such research. The public is more concerned about the

field than ever before; the psychiatric profession is more prepared to do research or cooperate with social scientists in joint research ventures than ever before; and the Federal Government has authorized grants to be made for research.

Research in the Extent of Mental Disorders. It must be admitted that our present resources in case-finding are uncomfortably slender. It is time that we began to think in terms of broad case-finding programs and of developing case-finding techniques comparable to those which have proved so successful in other public health programs.

Such studies should proceed on a broad front, utilizing the community-perceptive techniques of the social scientist as well as the clinical perception of the psychiatrist. While the psychiatrist and clinical psychologist are developing better screening and diagnostic devices, the sociologist and social worker should be discovering more about the mental health folklore of the community and the way in which people now handle personality disorders in order to mobilize the community more effectively for participation in the case-finding process. For it is the community rather than the clinician that operates the case-finding process today and that shall continue to be the chief case-finder until such time as diagnostic examinations are given routinely and regularly to all people. Special studies should also be made of the diffusion of a clinic's influence in a community.

As these research developments become effective, that is as case-finding and diagnostic skills increase, social scientists will be better able to study the ecological distribution of mental disorders, which in turn will direct special case-finding attention to areas of high incidence. Moreover, it then would be possible to conduct diagnostic surveys of communities, probably on a sample basis, to predetermine the "extent of the problem" in order that more systematic planning of mental health facilities could be accomplished.

Thus the problems of the immediate future in the basic epidemiological field of case-finding depend in no small part on the clinical and research cooperation of the social scientist.

Research in Etiology. As previously indicated, there are many intriguing ideas concerning the role of society in mental disorders, but their lack of specificity and validation for particular disorders has restricted their usefulness for mental hygiene operations. This is due primarily to lack of coordinated research in this field. On the one hand, clinicians have been too busy looking at the "trees," whereas, on the other, social scientists have been primarily interested in the "forest."

A variety of areas of needed etiological study have been suggested in previous pages, and these will be brought together here. In all of them the cooperation of the clinician and the social scientist is necessary, for it is essential to the problem that both clinical and socio-environmental data be available.

First of all we need intensive socio-clinical studies of various types of mentally disordered people. They should include a clinical history and diagnosis for each member of the family, an analysis of interpersonal constellations within the family, and of the relations of the family and each member to the community. This would enable the researchers to relate the patient's clinical symptoms and the underlying dynamics of his disorder to their broad psychological and social setting. It would also enable them to have, for comparative purposes, the same data on the members of the family not under treatment.

Secondly, we need intensive socio-clinical studies of a longitudinal nature, following individuals from birth, or even from the marriage of their parents, to childhood or adolescence. Again, the studies should encompass clinical data on all significant persons, data on family interpersonal constellations and family social history, and data on the child's psychological and social development.

Third, we need more intensive studies of personality structure and breakdown in a variety of cultural groups. Much of the current interest in cross-cultural personality structure is being pursued without adequate life history and clinical data. Such psychiatric studies of persons imbedded in different class and national cultures would not only provide a basis for vali-

dating present psychiatric theory, but would also provide insights into personality formation and structure that might otherwise escape us.

4 Fourth, attempts should be made to utilize the mass of data available to pediatric clinics or pediatricians in their daily professional practice. Data from even 100 pediatricians with psychiatric interests, scattered throughout the country, and using standardized records could provide a wealth of important data on such topics as child feeding and training techniques in relation to physical and psychological development.

5 Fifth, attempts also should be made to utilize the mass of clinical data available to psychiatrists in clinics or private practice. A standardized data sheet which included a diagnostic summary as well as key social data would do much to aid in testing ecological hypotheses and would permit analysis by social class and other significant environmental variables.

6 Sixth, we should systematically study personality reactions to the many types of abrupt and at times traumatic change in people's lives. Foster home placement; the unemployment, incapacity, or death of the head of the household; divorce; incarceration; and many other standard situations involving a break with the past and serious readjustment can be utilized for this purpose.

7 And finally, although this does not exhaust the list of socio-environmental studies that could profitably be mentioned, there is need for more laboratory studies of specific personality mechanisms, such as frustration, repression, the various substitutive processes, etc.

In short, we need more intensive studies of personality development and personality breakdown in various types of cultural environment; we need to draw on the reservoir of data available to medical practitioners; we need to utilize the experimental personality situations occurring every day in our communities; and we need further laboratory studies of specific mechanisms. The problem of adequate research staff is, of course, of great importance, but the problems of interdisciplinary cooperation

and the effective utilization of existing but uncoordinated sources of data are of even greater importance. Leadership in these tasks is sorely needed, for much of the pace of an epidemiological program depends on a satisfactory etiology.

Research in Therapy. It is widely recognized that the field of treatment is in great need of research. At present it represents a wide variety of techniques from lobotomy to psychodrama, whose reliability and validity, for the most part, are poorly determined.

Such research should conceive therapy in its broadest reference. Too often have we paid our respects to the importance of environment only to ignore it in the treatment of the mentally disordered individual. Our research attention should be directed not only to the psychotherapeutic sessions between doctor and patient, but also to the social world out of which the patient came, in which he is now living, and to which he will return. (37) This focus on the "individual in environment" means that psychotherapy should be supplemented in at least some of our experiments by what might be called "sociotherapy," observation and treatment of the patient's relevant social setting, both during his treatment and post-treatment periods.

This is not a new idea as social workers and others have for some time been supplementing the psychotherapeutic process with community liaison. But controlled experiments in such matters have not been made. It is time that we undertook careful evaluations of cooperatively designed projects in which the work with patient and environment is geared together from the onset of the trouble through a period of post-treatment care.

Much carefully controlled research is also needed in the field of psychotherapy itself, particularly in the newer field of the so-called group psychotherapies. A few such projects can be mentioned:

First, we need studies of the role of the therapist in the various psychotherapeutic situations and with various types of illness. What, for example, should be the role of the psychiatrist, the psychiatric social worker, and the clinical psychologist in the

ordinary therapist-patient (*i.e.*, the "two member group") situation, the discussion-group situation, the drama situation, etc.?

2 Secondly, we need studies directed toward the composition of the group in situations where the therapist is dealing with more than one person at a time. Under what circumstances, for example, should the group be confined to persons with similar neuropsychiatric syndromes, and when does this not matter or may even be less effective than other group composition designs?

3 In the third place, we need to study what goes on in various types of therapeutic group situations and to evaluate each type of situation (doctor-patient, free group discussion, unrehearsed psychodrama, etc.) for various mental disorders.

4 In the fourth place, we need to know much more about therapeutic designs combining two or more psychotherapeutic techniques. Under what circumstances, for example, is it most effective to combine individual and "discussion group" techniques, or these with psychodrama?

5 And, fifth, we need experiments on the most efficient use of clinical staff. What is the most economical and effective combination of psychiatrists, social workers, and psychologists in the treatment process?

6 One final point at which the study of socio-environmental factors is needed is in the social nature of the mental hospital. Institutional treatment has been carried on with too little recognition of the actual and possible effects of the hospital environment on patients. One such study is now being supported by the Public Health Service and is being done jointly by a psychiatrist and a sociologist. It is hoped that there will be considerable study of this problem, for research in recent years has shown the great importance of human relations in the success of industrial and other institutional programs.

Research in Prevention. Prevention is the ultimate objective of any epidemiological program. But it is a difficult objective as it depends not only on a sound knowledge of etiology but also

upon the reorganization of people's attitudes and behavior patterns and, perhaps, on social changes of some significance. In the field of mental hygiene the obstacles are still considerable, but it is possible to suggest areas of research which should be exploited.

The simplest type of project is that concerned with increasing the public's knowledge of good mental health practices. But such projects must be based on an intimate knowledge of the public's present mental health attitudes, knowledge and behavior, and also on a knowledge of the channels of communication through which various segments of the public can best be reached. (38) The former will permit the development of educational materials tailored to the folklore of each cultural level; the latter will point to the network of communication media, social groups, and leaders that are most influential in sponsoring new knowledge in the community.

A second type of experiment would combine such education with adequate counselling service. This is the type of experiment that could be conducted by community out-patient clinics. Various types of counselling service could be tested, including special clinical programs for mothers, school teachers, etc., to discuss mental health matters of interest to them.

A third type of prevention project is suggested by the Peckham experiment. This includes mental health education and counselling in the larger setting of a family-centered health and recreational organization. Questions of its general or specific applicability need to be answered, as do questions concerning the socio-medical dynamics at work.

This same general type of prevention operation—that is, mental health education and counselling in a situation where environmental controls can be modified—is also suggested by the experimental projects that have been started in public school systems and in specific industries. These should be encouraged because of the importance of these institutions in the lives of the people and because they provide more normal settings for such preventive work. In this way we would have a test of the rela-

tive merits of going to the people as against requiring the people to come to us.

4 A final type of prevention project, suggested by the "Back of the Yards Community Council" movement, places the psychiatric program in a still larger sociological framework, a community-centered social program. Here, again, mental health becomes a by-product of the reduction of social problems and the development of social integration, with the accompanying increase in a sense of belonging and self-respect. This is a large-scale attack and cannot be arbitrarily superimposed on a community. However, we could study the examples now under way.

Thus, the field of prevention has many challenging opportunities for research. We need to learn from past success and failure. Then we should support well-designed experiments, combining the skills of the clinician and the social scientist, and aimed to discover the most economical and efficient methods of preventing the wasting of human resources incident to personality malfunction. It may be a fifty-year quest, but we should begin now.

CONCLUSION

The subject of this paper is one of the crucial scientific problems of the day. It is also one of the really important practical problems, for as the world increases in complexity and as the sources of power, both political and physical, become more highly concentrated and more easily mobilized, the need for sanity is patent. The world has only recently witnessed the dreadful cruelty and destructiveness that can exist in civilized people, and the strange distortions in human personality that can be wrought by new and at times violent experience. The public has begun to meet this situation through the expansion of Federal mental health programs. It is now up to the relevant professions to make these programs effective.

We have chosen to place the subject of socio-environmental determinants of mental health in its full epidemiological frame of reference. We have tried to show the slim resources presently available for case-finding, the intriguing but unvalidated etio-

logical insights converging from many disciplines, the promising but still experimental techniques for treatment and prevention. And we have suggested lines of future research in each of these fields, stressing the need for more careful research design and the necessity for inter-disciplinary cooperation on a wide scale. The separation of the medical and social sciences has been too long a crippling force in the progress of our field, as has the separation of academic researcher and practitioner. The traditions and status differentials of the past cannot be allowed to shackle the opportunities of the present. In the study of this great frontier of human disability, we must utilize the scientific skills and imagination of all who have delved into the dynamics of the personal or group components of society.

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MEDICAL SERVICES IN NEW ZEALAND

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AMONG the free nations of the world, New Zealand has done the most "advanced" experimenting with state intervention to furnish medical services for all of the people. It is now ten years since provision for health benefits was written into the Social Security Act of 1938. The New Zealand plan for bringing medical care to all has been roundly condemned by the organized profession, both in the Dominion and overseas, and has been admired rather overcredulously by reformers at home and abroad. Actually, however, no comprehensive study of the scheme has heretofore been published in North America.

The essential feature of the New Zealand system of medical services is that the state pays for basic medical, pharmaceutical, hospital, and some other services. These benefits are universally available to the whole population without means test of any kind. Funds are raised through taxation. In compensating general practitioners, both capitation and fee-for-service methods are used, but the overwhelming majority uses the latter. Pressure from the profession has led to three major concessions: the fee-for-service plan, the right of the doctor to charge the patient more than the fixed fee, and state refund to the patients rather than direct collection by the doctor from the state fund. With these modifications, nearly all physicians in the country are practicing under the act, although the organized profession and the Government have not been cooperating to the extent necessary for a proper functioning of the scheme.

GENESIS OF THE NEW ZEALAND SYSTEM

Medical services in New Zealand, before the advent of the Labor Government in 1935, bore general similarity to those of

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other English-speaking countries. Most practitioners engaged in individual practice, and their compensation came mainly from fees for professional services collected by them from their patients. Except for the friendly societies and fraternal orders, there was little pre-paid medical care. In New Zealand, as in other countries, doctors accepted payments for workmen's compensation cases from insurance funds.

While the major features of medical practice were similar to those in the United States, Great Britain, and the other Dominions, a number of developments in auxiliary health services were rather unique. First, extensive public hospital facilities had been provided. These are managed by local elective hospital boards, each of which has jurisdiction over one of the forty-two districts into which the country is divided. Prior to the Social Security Act, local hospital boards relied for their finances mainly on fees from patients who could afford to pay, and from rates (land taxes). Counting all hospital beds, public and private, in 1945 there were about ten beds per 1,000 population.

Second, free dental services in the schools were well established. A fairly complete state dental service was gradually made available to primary pupils, beginning with the younger children in 1919. Third, great progress had been made in infant care through the "Plunket movement" founded by Dr. Sir Truby King in 1907 (1). The infant mortality rate of the Dominion consistently is one of the world's lowest, and credit is generally given for this achievement to the Plunket system of infant feeding, and training of mothers, hospitals, and nurses. Although state subsidies are now received, the movement was started with private subscriptions and still relies heavily upon them.

In addition, two other factors that affect health services should be borne in mind. Most New Zealand medical practitioners were trained in the Medical School of the University of Otago, in Dunedin. The standards of the medical school are high, and its graduates have made remarkable records in post-

graduate work in England and Scotland, and occasionally in North America. Finally, the geographic features of New Zealand affect the health of the people. Its remote situation and "mild but raw" climate serve to keep down some of the communicable diseases. Its sparse population (totalling only 1,750,000) and rugged terrain left many rural areas without adequate medical care or access to hospitals.

Health Policy of the Labor Party. The New Zealand Labor Party won a decisive victory in the general election of November, 1935, and has governed the country continuously since that time. Like the Labor Party in the United Kingdom, it is a non-doctrinaire and mild socialist party, more inclined to extend social security than to transform society. Its health program was only one unit among a number of new and expanded social services.

Early Labor programs and platforms contained little on the subject of medical care. Following the ordeals imposed upon the party during World War I, annual conferences began to adopt in piecemeal fashion various policies that eventually were codified and called a platform. The earliest mention of medical services appears to be that contained in a statement of educational policy adopted by the 1921 conference (2). There, and in the formal platform issued the following year, the party listed "free medical attention" among educational services. (3) Presumably this was intended for school children only. In the last compilation of platform appearing before the 1935 election, a similar item is included under "Education," reading: "Free medical attention to be available to all pupils attending schools." (4) "Health" is a separate heading just before "Education," and contains three clauses:

1. Nationalisation of the medical service, with free medical, dental and maternity attention.

2. The establishment of a State Housing Department for the purpose of providing better homes for the people, and at less cost by the elimination of private profit.

3. The establishment of baby clinics, at which the best medical skill and attention shall be available free of cost.

In Labor's election manifesto of 1935, a "National Health Service" is promised, that would:

(a). Give every citizen the right during ill-health to call in his own medical practitioner, to consult and receive the services of specialists where required, and by the reorganization of our Hospital System, to make available all other services that are necessary for the restoration and maintenance of health.

(b). Extend the Home Nursing Service so as to provide all the attention necessary for mothers and other members of families when it is not convenient for them to leave their own homes. The Labor Government will provide the necessary laboratory facilities to maintain the efficiency of the services, together with adequate payment to practitioners and others who carry out the work. The service will be available for every family. (5)

Another section of the manifesto contained the declaration: "Health services should be made as freely available as educational services."

In view of its platform and manifesto declarations, the Labor Government that took office late in 1935 considered it had a mandate to establish a health scheme with a broad variety of benefits, universal in application and free of payment for specific services by the patient.

Shortly after the new Government took office, it was announced that the Minister of Health, Mr. Peter Fraser, was considering a national health scheme, and that Dr. D. G. McMillan, a Labor member of the House of Representatives (M.P.), was helping to formulate it. In 1934, at the age of thirty, Dr. McMillan made a deep impression upon delegates to the annual party conference by what Mr. Fraser called "... an eloquent and deeply sincere speech on the subject of a National Health Programme for Labor." (6) He had written the only Labor pamphlet on the subject of health services, was the only physician among Labor M.P.'s elected in 1935, and

therefore occupied a very strategic position in organizing the health plan.

McMillan's views are expressed in *A NATIONAL HEALTH SERVICE*. His main criticisms of the British health insurance scheme were the limited services provided and the lack of universal coverage. The principles he laid down for a service in New Zealand were stated in the following terms:

Our New Zealand National Health Service must be 'free.' It must be complete; it must meet all the needs of all the people, and it must be characterized by six main essentials:

1. It must aim at the prevention of disease.
2. It must make provision for income . . . (lost through illness).
3. It must provide all the facilities for the diagnosis and treatment of disease.
4. It must be based upon the provision of a family doctor for every person.
5. The service must be founded upon the principle of the patient's free choice of doctor.
6. It must include adequate provision for research in all matters relating to health. (7)

The service could be financed, he said, either by special levies based on ability to pay, or out of the Consolidated Fund, but he commented that "... non-contributory insurance has the advantage of administrative simplicity and cheapness." (8) Dr. McMillan anticipated a wide range of services—general practitioner, specialist, nursing, hospital, pharmaceutical, and other—all free. There is abundant evidence that Dr. McMillan's views had much to do with the form and contents of the health sections of the Social Security Act. The aspect in which his outlook was most decisive appears to have been in the stress placed on the key role of the general practitioner, the family doctor who has a "thorough knowledge of the patient" and "long and personal contact."

Attitudes of the Medical Profession. The medical profession

of New Zealand was ill prepared to deal with popular and political demands for a national health scheme. A thoughtful warning had been given in early 1935 by Dean C. E. (now Sir Charles) Hercus of the Medical School, University of Otago. He told of the sorry plight of the British medical profession at the time Lloyd George brought into Parliament health insurance legislation. In country after country the profession failed to provide effective leadership in the formulation of health plans. Dean Hercus concluded:

No lesson stands out more clearly than that the profession should keep in the closest touch with those engaged in drawing up even tentative schemes and should be prepared to advise and direct development along the lines which are essential to the sound practice of medicine. (9)

Although the British Medical Association, New Zealand Branch, (hereafter BMA) did establish a "national health insurance committee," brought Sir Henry Brackenbury out from England to consult, and carried on a lively discussion of issues in its *Medical Journal*, the profession neither proposed a realistic, comprehensive scheme itself nor did it manage to maintain close contact with the Government while the provisions of the Social Security Act were being formulated.

The BMA position was defined in some detail in a letter dated July 6, 1937, and addressed to the secretary of the committee of Labor M.P.s appointed to advise the Government on health insurance. (10) The population would be divided into four groups, and health services provided on the basis of their capacity to pay for themselves. First, pensioners, unemployed, and others with comparably low incomes should receive a complete health service wholly at the expense of the state. Second, wage and salary earners with modest incomes would receive full services and would pay for the larger part of them. Third, persons not covered in the first two categories and below £500 per year income would receive hospital and specialist services, for which they should contribute to an insurance fund.

Fourth, all with incomes of £500 and over should make their own arrangements for health services, with the option of coming under the third plan if they chose.

In discussing administration of the proposed scheme, the BMA stressed, quite properly, that the medical profession should play a major part in managing health insurance. The plan outlined by the BMA in 1937 bore a general similarity to the health insurance scheme then in force in the United Kingdom. The British plan involved only two categories of the population, those covered and those exempt. Coverage included all manual workers and non-manual workers making £250 or less per year. The British plan did not include the families of employed persons.

Formulation of the Government's Bill. Both the Government and the BMA must bear some responsibility for the lack of consultation and compromise over the medical benefits of the Social Security Act. A committee of Labor M.P.s was appointed to advise the Government. Under the chairmanship of Dr. McMillan, it held hearings around the country. BMA leaders testified before the committee, although they did entertain doubts about its composition and personnel:

It did contain as chairman a member of the medical profession whose highest qualification for the position was a political one, a man who already had strong preconceived ideas on the subject, based on no personal knowledge of medical practice except his own relatively limited experience in this country. (11)

The McMillan Committee began its investigation by preparing and sending a questionnaire to ten groups that would be most affected by the proposed health legislation: physicians, hospitals, friendly societies, chemists, dentists, masseurs, nurses, opticians, ambulance societies, and life insurance offices. The questions concerned coverage, finance, benefits, and other matters. The report does not give a clear statement of the replies received, rather the committee mixed its own views with those of the respondents and presented rebuttals to the replies with

which it disagreed. Recommendations of the committee then followed. A *universal* national health service ought to be introduced. Medical benefits should begin with general practitioner, maternity, and auxiliary services, and later be expanded to specialist, nursing, and other fields. Pharmaceutical and hospital benefits would be instituted at once. Dental service, limited initially to extractions and provision of dentures, and expansion of the school dental service, was recommended. Aid to medical research and added support for health education were endorsed by the committee.

The committee argued in strongest terms for the universal principle, and attacked with vigor the BMA position of classifying people into income classes. "Unlike overseas people," the committee declared, "self respecting freedom loving New Zealanders will never respect or tolerate a service which gives one type of service to the poor and another type to the well-to-do. Any scheme which savours of a poor-man service, of charity, which divides the people into two groups, those able to pay private fees and those unable to do so; which differentiates in the mind of the doctor, either consciously or unconsciously, between patients would be foreign to the ideals and aspirations of the Government in particular and the people of New Zealand in general." (12)

Apparently the McMillan Committee considered only capitation as a means of remunerating doctors for general practitioners' services. Fee-for-service was not mentioned in the report. The committee did propose, however, that the maximum number of patients permitted on any practitioner's list should be 3,000. BMA representatives claim they did not see the report Dr. McMillan's committee made to the Government, nor was it published in a public document even after the Social Security Act was on the statute books. The Government and the BMA were increasingly suspicious of one another.

The next phase was dominated by the select committee of the House of Representatives known as the National Health and Superannuation Committee. It was established on motion of

the Prime Minister, Mr. Savage, and included in its membership of eleven were Messrs. Savage, Nash, and Nordmeyer, who was elected chairman, and S. G. Holland, who subsequently became Leader of the Opposition. In April, 1938, the Prime Minister submitted to the committee a memorandum containing the Government's social security proposals. Concerning health services, the "white paper" read as follows:

1. The Government proposes to provide:

- (a). A universal general practitioner service free to all members of the community requiring medical attention.
- (b). Free hospital or sanatorium treatment for all.
- (c). Free mental hospital care and treatment for the mentally afflicted.
- (d). Free medicines.
- (e). Free maternity treatment including the cost of maintenance in a maternity home.

2. The Government further proposes that these services should be supplemented, when organization and finances are available, by the following additional services:

- (a). Anaesthetic.
- (b). Laboratory and radiology.
- (c). Specialist and consultant.
- (d). Massage and physio-therapy.
- (e). Transport service to and from hospital.
- (f). Dental benefit.
- (g). Optical benefit.

3. It is also proposed to institute a free home nursing and domestic help service when the necessary staff has been trained to make such a proposal practicable.

4. Complementary to the foregoing proposals, the Government contemplates an extended educational campaign for the promotion of health and the prevention of disease. (13)

Judging from the report filed by the committee, the majority was able to reach a verdict in favor of the Government's proposals promptly. Half of the ten page report is taken up with a rebuttal of BMA arguments and with counter-proposals. The committee report lists five main points made by the BMA:

i. There is no need for a universal service while many people are able to pay for their own doctor and will prefer to do so.

ii. That the development of friendly societies and the growth of our public hospital system renders unnecessary a scheme of the extent proposed.

iii. That the proposal will lead to a deterioration of the standard of medical service.

iv. That the adoption of the universal scheme will lead to those very distinctions which it is the object of the Government to avoid.

v. That it may involve embarrassment to the commitments of medical men. (14) (through reduced earnings.)

Having disposed of the BMA's arguments, the committee proceeded to recommend to the Government and the House favorable consideration of the proposed legislation.

The BMA officials claim that they were assured that opportunity would be afforded them to examine the proposed bill before it went before Cabinet and House, but the bill was sent through without being submitted to them. (15) Dr. Douglas Robb, outstanding Auckland surgeon, declares:

Indeed, only after the Social Security Bill was introduced into the House were its contents made known to the B.M.A. There is no doubt that the Bill was political in its conception, and that technical and professional considerations were almost entirely ignored. (16)

HEALTH BENEFITS UNDER THE SOCIAL SECURITY ACT

Health benefits were provided for under Part III of the Social Security Act, 1938. (17) Five classes of health benefits are defined in the act: (1) medical, (2) pharmaceutical, (3) hospital, (4) maternity, (5) supplementary. The inaugural date for any benefit was to be fixed by the Minister of Health. All persons ordinarily resident in New Zealand are eligible for health benefits. Funds to finance the whole Social Security scheme are raised by a flat tax on all income (originally 5 per cent now $7\frac{1}{2}$ per cent) and an annual levy on all adults (£1

for men and 5s. for women), which has since been repealed. Additional moneys needed to finance the whole social security program, monetary as well as health benefits, are secured by transfer from the Consolidated Fund of the state.

A mere summary of the act gives insufficient emphasis on its principles and characteristics. The law anticipated a *universal coverage* of the total resident population, regardless of economic status. In this respect it pioneered, for British and other health insurance schemes, up to that time, provided for limited coverage only, usually employed workers receiving less than a stated yearly wage. The original British health insurance left out not only families, but also omitted the unemployed and the employed who made more than the stated wage. The New Zealand act was also unusual in that it was *non-contributory*, benefits being made available to all as a matter of right, regardless of whether or not taxes were paid for the purpose. New ground was broken, also, in the *comprehensiveness* of the benefits provided for. Nearly every conceivable contingency was anticipated and an appropriate benefit defined. No country, with the possible exception of Russia, had ever afforded its people more complete cradle-to-grave protection.

The election of 1938 followed shortly after the passage of the Social Security Act. No issue held greater interest for the voters than that of social security, and the Labor Party made the most of its popularity. Party literature called the 1938 act ". . . the greatest piece of humanitarian legislation ever passed by any Government in the history of the civilised world." (18) The Labor election manifesto declared:

The Social Security legislation now on the Statute Book will ensure to every member of the community, full and adequate hospital, sanatoria, medical, pharmaceutical, maternity and other health services. Provision has been made for vigorous measures aimed at the prevention of disease. (19)

Even during the campaign it was clear that the organized medical profession would not cooperate in the inauguration of

the scheme. The BMA denounced the medical benefits section of the Social Security Act in the strongest terms:

The Act determines the complete socialisation of the profession and institutes a system of medical service which has been aptly described as "demoralising to those that give it and destructive to those who receive it," a service providing the poorest type of treatment known to the Medical Profession. For the benefit of the health of the people of New Zealand in the future and for the preservation of all that is best for the profession of medicine, it is our duty to oppose to the uttermost this ill-conceived measure so strongly tainted by party politics. (20)

The Auckland president of the BMA was reported as declaring: "New Zealand doctors throughout the length and breadth of our country will not work the scheme."

An equally belligerent mood was in evidence among Labor leaders. Questioned regarding the BMA attitude of non-cooperation, Mr. Savage stated: "The Government will see that the law as passed Parliament is carried out." (21) Mr. Fraser, the Minister of Health, warned that if the profession continued its opposition, the Government "reluctantly" would be compelled to reconsider and introduce a "State medical service." (22) The *Standard*, weekly paper of the Labour Movement, headed an editorial on the subject: "Who Shall Govern?"

In January, 1939, the Minister discussed with BMA representatives the possibility of providing medical benefits on the basis of fee-for-service, but the profession was unwilling to make suggestions or proposals. (23) Beset with administrative problems connected with launching this huge program, the Department of Health moved slowly. The first benefit, free treatment in state mental hospitals, was put into force April 1, 1939, without opposition.

Maternity Benefits. The second class of benefits, maternity, was made available May 15, 1939. The services of hospitals, nurses, and physicians were involved under maternity benefits, and the first battle between Government and BMA was fought

over the terms of the contract between the Department and the medical practitioner. The success of the BMA in persuading doctors to withhold their services until more satisfactory terms were offered, encouraged elements in the profession favoring obstruction in the general practitioner field.

Contracts for maternity services were offered in April. Robb states that only two doctors accepted the contract. Further negotiations with the BMA led to revisions contained in the Social Security Amendment Act, 1939. The main provisions for maternity medical services, as revised, are as follows: (1) a scale of fees is fixed by agreement between the Minister and the BMA; (2) "every doctor affording services covered by the scale of fees must accept the fees from the Fund in full satisfaction of the claim for the services" with two exceptions (a) doctors who notify the Minister they will not provide services under the act, and (b) obstetric specialists who are permitted to charge the patient over and above the basic fee. (24)

The basic medical fee for maternity cases was set at £5 5s, (25) and was raised to £6 6s in 1946, and appears to be considered reasonable by the medical profession. In 1940, the Department reported that six practitioners declined to work under the act; in 1943 the number had declined to five. In order to collect the full maternity fee, the doctor must report five ante-natal and one post-natal attendances, and must have been present at delivery. Obstetrical specialists are those so recognized by the Minister. Application for such status is made by a practitioner; a recommendation is made by the BMA, and the Minister makes the final decision. Among the criteria used are proportion of practice devoted to obstetrics and membership in the Royal College of Obstetrics and Gynecology. In 1940, twenty-two were recognized as obstetric specialists. Only specialists and non-cooperating doctors may charge a patient more than the basic fee of £6 6s.

Hospital services for maternity cases are free or partially free, depending on the ownership of the hospital and the terms of the contract between the Department and the particular institu-

tion. Hospitals operated by public Hospital Boards and the state-owned St. Helens Hospitals (located in the four main cities) accept the social security payment as payment in full. Private maternity hospitals, almost without exception, have entered into contracts with the Department. Of the 201 under contract in 1943, only thirty-one accepted the allowance from the fund as full payment, and all others made additional charges to the patient. (26) The basic charges that may be claimed from the fund are £2 5s. for the day of delivery and 12s. 6d. per day for up to fourteen days of hospitalization.

The third type of maternity benefit, obstetric nursing in the patient's home, makes possible proper attendance in cases where a hospital is not used. Nearly 300 nurses have contracted to render such services, but the number of claims is only a small fraction of those made for hospital services. For full-time domiciliary services, nurses are paid 13s. per day up to fourteen days; for part-time visiting services, 5s. per day for the same time limit. Provision is also made for delivery by mid-wives.

For an annual cost to the state of between £500,000 and £600,000, or around 6s. per capita, New Zealand has removed most of the financial burden of childbirth from the family and placed it upon the community. In so doing, it has made medical care available in maternity cases, regardless of the ability of parents to pay. The scheme has not yet operated long enough to assess the social consequences of maternity benefits. The most crucial questions in this field appear to be: (1) Can New Zealand's infant mortality rate, already one of the lowest in the world, be reduced still further? and (2) Will the maternity benefits increase the birth rate and the size of the families? The impact of the war has made statistics of the era 1940-1947 period difficult to evaluate. The introduction, in 1946, of universal family allowances, without means test, may make differential diagnosis difficult in the future.

Maternity benefits have been the most satisfactory of the main classes of health benefits under the Social Security Act. They are comparatively easy to administer and difficult to

abuse. An absolute check over practitioner, patient, and hospital exists in the form of birth records. Perhaps greatest public support would be given to this aspect of health benefits, thanks in part to the great educational work done by Dr. Sir Truby King, and the monuments of his endeavor—the Plunket movement and the Karitane nurses.

Hospital Benefits. Hospital benefits, for other than maternity cases, became effective for in-patient treatment on July 1, 1939. In practice this means that hospitalization is free in public hospitals run by Hospital Boards and in semi-public hospitals like the Karitane Baby Hospitals. Private hospitals may collect from the fund the 9s. per day per patient allowed to Board hospitals, and from the patient whatever extra charge is approved by the Minister. The amount allowed varied with the accommodations provided, e.g. private room, two-bed, or four-bed rooms.

Out-patient treatment by Board hospitals was included in hospital benefits beginning March 1, 1947. The fund simply subsidizes the Hospital Board operating an outpatient service with a grant covering 60 per cent of costs of that service.

Charges on the social security fund for hospital services are larger than for any other class of health benefit. The total yearly cost to the fund has been over £2,000,000 since 1943–1944. To arrive at the total bill for hospital services, paid for from public funds, one must add to the above sum another £1,000,000 which Hospital Boards receive from local levies on the unimproved value of land. Other smaller sums must be included to cover the cost of mental, convalescent and other hospitals maintained by the state out of general funds.

What has the hospital benefit done to the hospitals? For one thing, it has been a factor in filling them to capacity and has necessitated their extension. Far from relieving Hospital Boards of financial burdens, it has added greatly to their responsibilities and their costs. This arises from the fact that 9s. per day does not pay the full cost of keeping a patient in a hospital, and the extra amount must be raised by the land tax. The

charge is sometimes made that the availability of hospital benefits has caused a large number of chronic and minor cases to fill hospital beds, leaving a minimum of space available for cases in great need of hospitalization.

The medical profession, as represented by the BMA, has become concerned over the fate of the private hospital, lest the doctor in private practice lose his "workshop" and the trend toward state salaried service be accentuated. It is rather paradoxical that the two methods proposed for strengthening the private hospitals involve state action: (1) increasing Government subsidies, and (2) securing higher fees through an order of the stabilization authorities. (27)

Medical Benefits. The Government delayed until 1941 opening up the Pandora's box of general medical benefits. It was in this field that the BMA had uttered its most shrill challenge, and in this field the medical profession enjoyed, through the solidarity of its organization, a virtual monopoly over the manpower necessary to operate any such scheme. Here, indeed, was the battle that would decide the course of the war between the Government and the BMA. On the Government side, there was a reassignment of responsibilities; Peter Fraser had become the Prime Minister on Mr. Savage's death; after a brief transitional arrangement the portfolio of Health was turned over to A. H. Nordmeyer.

A. Capitation Plan. The first big jump was made on March 1, 1941, when medical benefits under the capitation scheme were made available. People were entitled to choose medical practitioners and to enter into agreements with them for general medical services, excluding maternity and specialist services. The fund would compensate cooperating doctors at the rate of 15s. per year for each man, woman, and child on the practitioner's list, or panel. The doctor is also entitled to receive a mileage allowance for each patient residing from three to twenty miles away. The procedure is similar to that under the British health insurance scheme. The patient had free choice of doctor and

the doctor could accept or reject patients. No limit was placed on the number of patients a doctor could have under the capitation plan.

The BMA had been girding its loins for such an announcement for a long time. In 1938 it had inaugurated a fund to assist practitioners who might otherwise be forced to accept service under the act. The BMA advocated non-cooperation and was gratified that only a small number of practitioners signed up under the capitation plan. (28)

Capitation is still in operation, but its use has declined fairly steadily. Charges on the fund for capitation services were £55,612 in 1943-44, £42,400 in 1944-45, and £38,084 in 1945-46. (29) In some sparsely settled areas, capitation appears to have worked well. Some practitioners in urban areas took to the plan, and found large monetary rewards were possible through it. The Health Department, in noting the reduction in use of the capitation plan, commented in 1945:

This was to be expected, as the capitation scheme has certain disadvantages to both doctor and patient when working side by side with a fee-for-service system. The capitation system, however, is sound in principle, and it has yet to be proved that it is not the most satisfactory form of medical insurance practice. (30)

When the BMA conducted a plebiscite of its membership in 1945, only fourteen doctors reported conducting practice under the capitation plan, but thirty-five said they preferred the capitation system over other plans. After Mr. Nordmeyer explained to the 1942 annual conference of the Labor Party that the fee-for-service system was "only a stop-gap," the conference reindorsed the capitation system. (32) Despite the determination of the Labor people to the contrary, it appears that the BMA will determine, by negative action if not by positive, the remuneration scheme to be used.

It is doubtful if the majority in the medical profession will ever be reconciled to the capitation system, so long as the coverage is universal and service is free. New Zealand doctors de-

veloped a prejudice against capitation as it operated under British health insurance, partly because of the low remuneration offered. In the report of the BMA Medical Planning Committee, further consideration of the capitation system is conditioned upon: "A definition of the content of general practitioner service would have to be made, a schedule of duties drawn up, and all beyond that should be left open to charge of fees, subject to the refund principle." (33) Much of the BMA attack upon capitation as introduced in 1941 centered around the argument that it would make difficult the reentry into practice of medical men then in the armed forces.

The BMA freely conceded the advantages of the capitation plan from the Government's point of view. The costs of operation could be computed with considerable exactitude. Administration is rather simple. The BMA contended, however, that an unfair burden of risk was placed upon the practitioner, who must provide medical services for a set amount per year regardless of the amount of illness encountered.

B. Fee-for-Service System. Soon after the capitation plan was inaugurated, it became obvious that the medical profession would not cooperate under that system to an extent sufficient to get medical care to all of the people. The Government then began to consider seriously the instituting of a fee-for-service plan. Its initial proposal was for a fee of 5s. per attendance in the doctor's surgery and 6s. 6d. in the patient's home. There was an outcry in the profession. Eventually the Government compromised on two points. The scale of fees was raised to 7s. 6d. for an ordinary weekday consultation, in either office or home, and to 12s. 6d. for a night or Sunday call. The right to charge over the fixed amount was also granted. At the time the labor caucus and Cabinet yielded on the latter point, those who were negotiating with the BMA for the Government were under the impression that some 90 per cent of the doctors would accept the set fees as full payment. The fee-for-service system was put into effect on November 1, 1941.

The BMA then adopted the stand that the profession should carry on as usual, and continue to charge normal fees. Professional services would be rendered and the patient billed for the customary amount. A common fee for an ordinary daytime consultation is 10s. 6d. (half a guinea). The patient pays, receives a receipt, submits the receipt and proper form, and gets back from the fund the 7s. 6d. allowed. This is called the "refund plan." The Government prefers to have the doctor claim payment direct from the fund, and accept the reimbursement allowed as full payment for his service; this is the "direct claim" method of remuneration. A third variation has arisen in practice: the doctor claims direct from the fund, but also requires the patient to pay him an additional amount; this is known as the "token" system.

1. *The Refund Plan.* Refund, the method of remuneration favored officially by the BMA, involves the payment of the doctor's fee in full by the patient, who may then recover the set amount allowed from the social security fund. The only variation from the traditional practice in this scheme is the requirement that the practitioner provide a receipt for the patient. Except insofar as patients consult their physicians more freely since they know a part of the fee is refundable, the normal pattern of practice is not interfered with. A committee of the BMA summarized the advantages of this system as follows:

This method causes the least interference with normal conduct of practice. The relationship of doctor and patient is not intruded upon by any interested third party. The doctor can give his patient the attention and service he requires, and graduate his charges thereto. The patient retains some responsibility for his own treatment, which is not a negligible matter, while obtaining return for his taxation without temptation to overdo it. (34)

It also is argued that the receipts issued constitute a full record of a doctor's earnings for tax purposes. Neither patient nor doctor, the BMA claims, is likely to abuse social security funds under the refund plan. In its referendum of 1945, the BMA re-

ceived replies from 368 general practitioners, of whom 221 practiced under the refund system, but only 172 indicated their preference for refund over other systems. (35)

The Department of Health has found the refund system difficult and very expensive to administer. Around 30 per cent of the refund forms are incorrectly filled out by patients, necessitating further correspondence and delay before payment can be made.

2. *The Direct Claim Plan.* Direct claim, generally called fee-for-service in medical circles, means that the doctor provides services for the patient and submits the appropriate form, signed by the patient, to the Department of Health in order to receive remuneration from the fund. He accepts such compensation as payment in full, and receives nothing from the patient directly. The Government favors this plan, for it greatly simplifies the administrative procedure and is less costly. The forms submitted by the doctors, with few exceptions are correctly filled out. Only a relatively small number of payments is required to satisfy all direct claims made by doctors, whereas the refund system involves millions of payments to patients per year.

The BMA argues that patients may call upon a physician for service unnecessarily if that service is entirely free, and that some doctors will make an excessive number of calls in order to collect the additional fees. The danger of the patient over-demanding services certainly exists in both capitation and fee-for-service schemes. It is difficult to see how a conscientious doctor would overvisit under any system. Basically the profession opposes the direct claim plan because it interferes with the traditional method by which the doctor collects his fee for services rendered.

In the BMA referendum, 110 of the 368 general practitioners reported they were operating under the fee-for-service (direct claim) system, and 135 stated that they preferred that system. (36)

3. *The Token System.* Out of the fee-for-service plan, with its provision for remuneration either by refund or direct claim,

emerged a third variation which combines features of both. The doctor makes a direct claim for the statutory fee and also receives an additional payment from the patient. The profession has given this mixed method of remuneration the name of "token." A common example of token is for the doctor to charge 3s. above and beyond the amount he will collect directly from the fund.

From the beginning the BMA branded the token plan as undignified, despicable, and possibly illegal. The BMA medical planning committee declared: "It is the equivalent of asking for a tip." (37) An opinion that the token method was illegal was obtained from counsel for the BMA, (38) but Department of Health officials found nothing illegal about it. BMA spokesmen also condemned the token plan because it allegedly permits dishonesty and tax evasion. Certainly refund provides tax authorities with receipts that can be checked against income tax returns, but the token plan offers no more temptation to evasion than the pre-Social Security methods of collecting in full from the patient.

From the Department point of view, token is preferable to refund, largely because direct claims from doctors are easier to pay and cheaper to administer than refund applications. The patient has every reason to favor token over refund, because he is relieved of the necessity of filling out forms and going to the Post Office to cash his warrants. The doctor is protected against excessive calls by the patient through the same deterrent that operates under refund, namely the collection of a non-refundable amount beyond the statutory fee.

At the time of the BMA referendum of 1945, the token system had been so thoroughly denounced by the medical planning committee as illegal that it is not surprising that few doctors were willing to declare they practiced under it. Only eighteen of the 368 general practitioners answering stated they conducted their practice under token, and the same number declared they preferred it. (39) Letters from practitioners to the editor of the *New Zealand Medical Journal* denied the stigma of illegal-

ity and claimed the referendum question on token was prejudiced by "false information." (40) After an exhaustive discussion and many votes, the council of the BMA decided in 1946 to empower the executive to negotiate with the Government on the token system. (41) Department records do not show what proportion of practitioners uses token, for all direct claims from doctors are grouped together. By 1946, however, around one-half of all moneys paid from the fund under medical benefits was paid directly to doctors. This may have been a factor in the BMA decision to reopen negotiations which may lead to the abolition of the refund system. Certainly the profession cannot indefinitely stand fast on the "principle" adopted in 1941, and reiterated in 1945, "to practice as hitherto and enable patients to claim a refund of the statutory fee." (42)

C. Salaried Service. The Social Security Act empowers the Minister of Health to make special arrangements in order to provide medical services for people living in remote areas. This has been provided mainly by salaried medical officers. The base salary is high enough to attract young doctors into sparsely populated back-blocks that would have little chance of medical service under ordinary conditions. The salaries offered range from £1,100 to £1,700 per year, and the doctors are also permitted to charge fee-for-service for patients not ordinarily resident in the district. Eighteen physicians were in the salaried service in 1946.

One critic of the New Zealand system of medical care regards salaried personnel for remote areas as "logical and satisfactory." (43) The BMA committee opposes this salaried service, however, and proposes that the back-blocks should be served by private practitioners, using the fee refund method, and collecting mileage from the social security fund. (44)

Fear of a universal salaried service, in the long run, may be a potent factor in making the organized profession adopt a more conciliatory attitude toward the Government proposals. The wholesale use of salaried service is unlikely to be resorted to by

any Government without extreme provocation. During the war the shortage of doctors in the country gave the profession extraordinary bargaining power. The return of physicians from the armed forces and the graduation of new doctors from medical school is rapidly correcting the deficiency in medical personnel. If a complete break should occur between Government and BMA, it is conceivable that a general salaried service could be recruited from Great Britain and from those willing to co-operate within the Dominion.

PHARMACEUTICAL BENEFITS

The promise of "free medicines" was redeemed with the inauguration of pharmaceutical benefits in May, 1941. The Minister of Health entered into contracts with pharmacists, who agreed to fill prescriptions of medical practitioners for persons covered by the act. Pricing of each prescription is done according to a "drug tariff" issued by the Department. In practice, employees of the Department price every ingredient in each prescription, and then add the cost of container and the chemist's profit. A tremendous staff, estimated at 100 for the Dominion, is required to price prescriptions and reimburse pharmacists for services under the act. It is estimated that around 90 per cent of all prescriptions in the country are paid for by the fund.

The cost of pharmaceutical benefits has been surprisingly high. The first full year of operation, 1942-1943, the cost was £563,247; for 1943-1944, £762,198; for 1944-1945, £980,237; and for 1945-1946, £1,133,366. (45) The large size of the drug bill is regarded by the Department as "very disquieting." For 1945-1946 the pharmaceutical benefits cost nearly as much as medical practitioner services. In one sense, it is the medical profession that must bear responsibility for over-prescribing; there are innumerable instances of unnecessary and expensive prescribing. Actually, there are administrative procedures that can be adopted to reduce both abuses and cost of administration. The best hope seems to be the adoption of a set formu-

lary from which doctors can prescribe, eliminating unusual and expensive ingredients.

SUPPLEMENTARY BENEFITS

X-ray diagnostic services were started in August, 1941. At first limited to radiological services provided by Hospital Boards, in 1942 benefits were extended to such services provided by private practitioners. Those in private practice are divided into two groups: "absolute" recognition is extended to practitioners who are permitted to do all classes of radiological work; "limited" recognition is granted to those permitted to do only certain classes of work. Two sets of fees are in use: one for those with absolute recognition and one for those with limited. Radiological work done by Hospital Boards is paid for on the limited scale of fees. Claims for x-ray services are made by practitioners directly against the fund. Since 1944 the fund has paid more than £100,000 per year for radiological services.

Massage services, begun September, 1942, are available to patients on the recommendation of medical practitioners. The contracts between Minister and masseur permit the latter to collect 3s. 6d. from the fund for each office treatment, but he is not permitted to charge the patient more than 3s. 6d. additional. Virtually every masseur in private practice has entered contracts to provide service under the act. For the last two years, massage services have cost the fund more than £30,000 annually.

District nursing benefits, introduced in September, 1944, make free to the patient the nursing services provided by Hospital Boards, various Departments, and subsidized associations. For 1945-1946 the cost to the fund for these services was £58,880.

Domestic assistance will be provided at fund expense under certain circumstances when a mother is incapacitated. Payment is made in the form of a subsidy to an association which provides such service.

SCHOOL HYGIENE

Although the School Medical Service was established thirty-

five years ago, work in the field of school hygiene has expanded greatly since the Labor Government came to power in 1935. The early work of the Division of School Hygiene was confined largely to conducting physical examinations of primary school children, a function that still looms as very important in the school health program. The division aspires to examine school children three times during their primary careers: at entry, mid-way, and at graduation. Operating with only fourteen medical officers out of an authorized strength of twenty-four, the division conducted over 75,000 medical examinations of primary pupils during 1945. (46) Approximately 40 per cent were found defective in one or more particulars; nearly 10 per cent suffered from subnormal nutrition. Pre-school children are also examined; in 1945 just under 7,500 tots received medical inspection. Diphtheria and whooping cough immunizations are given to both pre-school and primary children.

Among the innovations of the Labor Government in child health are the milk-in-schools scheme, free apples, health camps, and aggressive health education campaigns. The free milk plan was started in 1937 in order to induce children to consume more milk of good quality. When available, milk that is fresh, bottled, and pasteurized is served once daily to primary pupils. In areas where safe fresh milk is not available, supplies of powdered or malted milk may be furnished. During 1946 horse-racing enthusiasts attributed the lack of light-weight jockeys on the race course to the school milk program. The free apple scheme was started in part to relieve the market of a surplus that developed when war in 1939 cut off export markets. It is now a permanent feature of the school health program.

The health camp movement has developed extensively during the past ten years. School children with correctable defects are selected by the school health officers and nurses to spend periods in the camps. Some are operated the year around, but most are summer camps. The camps are supported in part through sale of special "health camp" stamps which may be used for postage.

Since the appointment of an outstanding and aggressive director of the Division of School Hygiene in 1940, a persistent campaign of health education has been conducted. The long-run program centers around the school child. Every effort is made to expose him to the best information on health matters. The walls of every school room in the land are hung with posters that exhort pupils to "Drink More Milk," "Get Your Vitamin C," "Eat Those Vegetables." Teacher training colleges have elevated health education to an important position, and in due course New Zealand's teachers will be fully prepared to lead school children in matters of health.

Work done with pupils, however effective, is not enough. The child's food and other habits are determined largely in the home, so if progress is to be made in this generation, parents must be educated too. If the father and mother are unsympathetic with the health lessons taught to the child, the learning is unlikely to "stick." Therefore many channels have been used to inform parents and the general public. Posters and placards are used in public buildings, railways, trams, and busses. Radio broadcasts are used to hammer home the story of health. The director himself did a three minute early morning broadcast, beamed to fathers, daily for four years. A longer program is heard over national network weekly. The division also conducts a travelling "health show," a fairly elaborate modern museum utilizing demonstrations, exhibits, lecturettes, and films with sound. During the day, this show is used for adolescent children; in the evenings it draws adults. The show is popular and is considered one of the most effective means of reaching the general public.

DENTAL SERVICE

The School Dental Service, now the National Dental Service, in 1946 celebrated its twenty-fifth anniversary. It was established in 1921 to make available to school children the early attention to teeth that is required to combat dental caries, which the director of the service has called "the most prevalent dis-

ease afflicting civilised peoples." (47) New Zealanders have notoriously poor teeth. Men inducted into the armed services in World War II were found to run 50 to 60 per cent with artificial dentures and 23 per cent complete upper and lower sets. (48) Of the 75,000 primary school children examined in 1945, only 2.99 per cent of the European and 6.43 per cent of the Maori children had perfect teeth; of the 7,500 pre-school youngsters examined, 7.48 per cent had caries. (49)

Perhaps the three most distinguishing features of New Zealand's Dental Service are the use of dental nurses, the comprehensiveness of its coverage, and the support of the dental profession. The idea of training and using dental nurses was conceived by Thomas A. Hunter, first director of the service, who recognized how slow would be the development if reliance had to be placed upon dentists, who were short in supply and whose level of compensation would soon exhaust available funds. Therefore primary reliance was placed upon young women, who receive two years of training and then are deemed qualified to conduct ordinary clinical operations under the general supervision of dental officers. The nurses fill teeth, make extractions, and perform other operations that usually would be done by a professional dentist. At first the dental profession was not fully convinced that dental nurses should be given such responsibilities, but eventually it was won over. (50) Students entering the Dental Service agree to serve a minimum of five years, two as student and three as dental nurse. Trainees are paid a small salary, and those that live outside Wellington, where the training center is located, receive a lodging allowance. In 1946 there were over 400 dental nurses at work in the country and nearly 200 more in training.

Free dental service is provided to pre-school and primary school children, and in 1946 free service was extended to adolescents, gradually to be extended up to age 19. During 1945, 210,920 children were treated, of whom less than 25,000 were of pre-school age. (51) The total number of operations was over one and one-half millions, of which over one million were fill-

ings. The immediate goal is the service every six months of every person in the Dominion up to age of 19. Post-school young people will be served by private practitioners on a fee-for-service basis until sufficient dental officers can be secured for the service. To facilitate the recruiting of dentists, the Dental Service is offering bursaries to dental students at the University of Otago; students agree to accept public appointments after graduation for designated periods, varying with the amount of bursaries received. In 1946 there were some seventy-six students in the dental school on state bursaries. (52)

It is unusual for a profession to permit persons less fully trained to practice any part of their art without viewing with alarm or protest. In this regard the New Zealand dental profession is indeed remarkable, for a state service has been developed that soon will cover nearly one-third of the population of the country, and a large share of that service is carried out by dental nurses. One of the reasons for this situation may be the extraordinary need for preventive work in the dental field. Another factor may be that dentists have all the work that they can do. It may be due in part to the excellent leadership of the state dental service, which has never advanced too far ahead of the thinking of the profession to fall into conflict with it. In any case the expansion of the service has been attended by the good wishes and active support of the overwhelming majority in the profession. The gazetting of regulations governing the extension of the service to age 19 might have been an occasion for conflict between the profession and the Government, but there seemed to be an agreement as to necessity for increased coverage, scale of fees for private practitioners in the transitional period, and ultimate conduct by salaried dental officers.

Surprisingly little is known about the reasons for defective teeth. A dental research committee has been established under the Medical Research Council, and may produce, in the future, some significant light upon a very dark subject. The nutrition research committee under the Council has already published several studies that have an important bearing on tooth dis-

ease. Much of the responsibility for poor teeth is traced to faulty diet, but any considerable advance in this field must wait for the lessons of health education to penetrate the public consciousness and for other Government agencies to cooperate by making the right sort of foodstuffs available at reasonable prices.

APPRAISAL OF THE NEW ZEALAND PLAN

Coming to power in 1935, the Labor Government proceeded to introduce legislation to carry into force the various planks of its platform. Among the matters on which it assumed it had a popular mandate was the provision of a national health service, including free medical, dental, hospital, and other care.

In Planning. In order to implement this promise, the Minister of Health, in July, 1936, appointed a National Health Insurance Investigation Committee to investigate the matter of providing medical and other treatment services. Although it held hearings through the country and collected the views of many interested persons, it cannot be regarded as an impartial and representative board of enquiry. This is the sort of task that traditionally has been performed by a Royal Commission in all British countries. Such a commission might have included top representatives of the medical profession and outstanding laymen from various walks of life. Its hearings would have commanded more widespread respect and attention than could those of a departmental committee, and service on the commission might have informed and modified the views of the leaders of the BMA.

Among the witnesses who appeared before the committee were representatives of the BMA, who presented a plan which was limited in its coverage and at variance with the Government's determination to introduce a universal scheme. The profession and the Government could not reach agreement on a common plan, and the blame for the impasse belongs in part to each. The profession probably was not consulted as fully and frankly as it had a right to expect. On the other hand, the

profession was unyielding and, despite the timely warning of Dean Hercus, did not keep in close touch with the development of the Government's plan.

In Launching. Before enacting legislation for a general social security scheme, of which health benefits were to be a part, the Government moved in the House of Representatives to create a select National Health and Superannuation Committee which was composed of both Government and Opposition members. The Committee received from the Prime Minister detailed proposals regarding social security, and confined its work largely to reviewing and approving the Government's plan. Further hearings were conducted, but heavy reliance was placed upon the work of the McMillan committee. Under the rules of the House, no minority report by opposition members of the committee was permitted, so the criticisms of the scheme had to be presented orally to Parliament and country.

The Social Security Act of 1938, which contained the health benefit provisions, was passed by the large majority which Labor then held in Parliament. When the capitation scheme of compensating general practitioners was placed in operation in March, 1941, the great majority of the profession refused to participate. In order to get medical benefits functioning, the Government instituted, in November, 1941, a fee-for-service plan. While the BMA was willing to have its members practice under the new plan, it urged them not to collect fees directly from the state fund, but to leave collection to the patient. This "refund" method appealed to the BMA because it kept direct Government intervention out of the doctor-patient relationship.

In Operation. The first phase of the health program, maternity benefits, which commenced in May, 1939, are now generally accepted by the profession and enjoy a large measure of public support. Concerning medical benefits, it is obvious that the capitation scheme will not be generally used by the profession so long as fee-for-service exists side by side with it. The latter assures the practitioner of compensation roughly

proportionate to services rendered; capitation imposes upon the doctor the indefinite obligation to provide all attendances required by the persons on his panel. Although the Government may still look upon the capitation system with nostalgic interest, the profession certainly would resist its reinstitution as the sole scheme of remuneration under the act.

Under fee-for-service, the direct claim plan has many advantages over the refund plan. The state, under direct claim, is relieved of unnecessary administrative expenses and a heavy burden of paper work. The patient is spared the nuisance of filling out forms, which he often does incorrectly, and delay in securing payment from the social security fund. The refund scheme is favored by the BMA, but it is difficult to see much validity in the argument that direct claim interferes with the doctor-patient relationship. The limited use of salaried medical officers in remote areas is certainly defensible.

Although the leaders of the organized medical profession persist in their emphasis upon abuses that have emerged in the operation of medical benefits, such as overvisitation, overprescribing, unnecessary calls by the patient, and the like, there are many in the profession and the public who stress the gains, such as seeking early medical advice as a right not as charity, eliminating the barrier of expense from extra consultation and treatment, and releasing the doctor from concern over collections.

Despite the controversy that attended its inception, we think that the New Zealand plan is a good start toward getting health services to all people regardless of their economic circumstances. We believe that most of the abuses and difficulties that have emerged could be remedied rather quickly if the Government and the medical profession would learn to cooperate with one another. The Government must recognize that professional men and women are entitled to an important voice in determining the conditions under which they shall work. The profession must understand that the feature of universal coverage of health services is highly popular with the people, and that the

doctors will lose in the long run if they adopt uncooperative attitudes.

Finally, we think that the whole field of health benefits should be subjected to searching enquiry by a Royal Commission, headed by a chairman, recognized generally by the public as competent and impartial, and on which the medical profession should have representation. A thorough investigation is needed before further expansion of services, and might do much to bring the Government and the BMA close enough to provide the basis for real cooperation which is prerequisite to proper functioning of the scheme.

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SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

VIII. THE COMPARATIVE INFLUENCE ON FERTILITY OF CONTRACEPTION AND IMPAIRMENTS OF FECUNDITY¹

P. K. WHELPTON AND CLYDE V. KISER

THE extent to which childlessness and small families result from defects in the reproductive system and from deliberate efforts to space pregnancies, limit their number, and terminate them by illegal abortion is a question which has been discussed at length. The case histories accumulated by physicians and (more recently) planned parenthood clinics, as well as the field studies of demographers, show conclusively that an important proportion of childless couples want a child but either are not able to conceive or, if conception occurs, the wife cannot carry the fetus to term. Similarly, some of the couples with one or more children want an additional child but are physiologically unable to have it. At the same time such records and the information regarding the manufacture of contraceptive materials and appliances make clear the fact that efforts to prevent conception except when desired are widespread and effective. Finally, these sources and surveys by other agencies indicate that an important proportion of unwanted pregnancies are terminated by illegal abortion.² Heretofore, however, there

¹ This is the eighth of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The Committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; Clyde V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton.

According to definitions adopted by the Population Association of America fecundity is the physiological ability to participate in reproduction, and fertility is the use of this ability (*i.e.* the production of children). The fecundity of couples is considered to be impaired in this analysis (1) if the wife could not conceive, (2) if conception required a long period of exposure, (3) if an unduly large proportion of the actual pregnancies were terminated by miscarriage (unintentional abortion) or therapeutic abortion, or (4) if a physician said that conception probably was impossible or that if it occurred the pregnancy probably could not end in a live birth.

² For example of studies of the incidence of sterility, the use of contraceptives and the practice of illegal abortion, *see*:

(Continued on page 183)

seems to have been no single investigation in which information bearing on all of these matters was collected from a large and representative group of the population as was done in the Study of Social and Psychological Factors Affecting Fertility, in Indianapolis.³ In consequence, it should be of value to determine the relative influence of impaired fecundity and deliberate family limitation in reducing the fertility of the 1,977 couples covered by this study.⁴

One procedure which might be suggested for such an analysis is (a) divide the couples into two groups, those normal (or above) in fecundity and those below normal, (b) subdivide each of these groups into two subgroups according to whether the couples did or did not try to control family size and spacing, and (c) compare the birth performance of these four subgroups. This procedure is impractical because almost all of the native white, urban, Protestant couples with at least an eighth grade education either try to regulate the number or spacing of their children or know that they do not need to do so because it is difficult or impossible for conception to occur. Among the

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³ This study included a large and typical sample of the native-white Protestant couples with at least an eighth grade education, married in 1927-29, the wife under 30 and the husband under 40 at marriage, and living in Indianapolis in 1941. Information was gathered relating to the 12 to 15 years of married life.

⁴ Schedules were completed for 1,080 couples, but because of the sampling plan which was followed these couples are considered to be representative of 1,977 couples. See Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. V. The Sampling Plan. The Milbank Memorial Fund *Quarterly*, January, 1946, xxiv, No. 1, pp. 49-93.

1,977 couples in this Study there are only six who never used contraceptives and who also had not been obviously below normal in their ability to conceive during at least 2 years of their married life.⁵

In view of the foregoing the best procedure appears to be to use the experience of the couples in this study while they were apparently normal in fecundity and were not practicing contraception as a basis for estimating what their birth performance would have been if these conditions had existed throughout their married life. This gives a theoretical measure of the fecundity—the potential maximum fertility—of the group. In other words it shows the expected size of family of couples found relatively infrequently in the urban population, namely, those who during the first 12 to 15 years of their married life are normal or above in fecundity and do not resort to contraception or illegal abortion. The extent to which this high potential level of fertility is reduced by sterility and the less serious defects of the reproductive system can be measured by comparing the foregoing estimate with an estimate of birth performance based on the experience without contraception of *all* couples, including those with impaired fecundity. The differences between the two sets of estimates should represent the reduction due to low fecundity and sterility.

A. ESTIMATING THE REDUCTION IN FECUNDITY (THE PHYSIOLOGICAL CAPACITY TO REPRODUCE) CAUSED BY DEFECTS IN THE REPRODUCTIVE SYSTEM

In order to estimate the number of pregnancies and live births that would occur to all couples, and to those normal (or above) in fecundity, if contraception and illegal abortion were not practiced, it is necessary to have the following information:

1. The proportion of couples that would have a first conception, a second conception, etc., if contraceptives were not used,⁶

⁵ Two of these six wives were sterilized a few months before the interview, after each had had eleven pregnancies.

⁶ "Abstinence" (avoiding coitus for a period of at least one month except for
(Continued on page 185)

ORDER OF PREGNANCY	ALL 1,977 COUPLES			COUPLES ASSUMED NORMAL (OR ABOVE) IN FECUNDITY					
	Number of Couples ¹	Per Cent of Couples on Preceding Line	Per Cent of 1,977 Couples	1,680 Couples (85 Per Cent)		1,483 Couples (75 Per Cent)		1,186 Couples (60 Per Cent)	
				Number of Couples	Per Cent of 1,680 Couples	Number of Couples	Per Cent of 1,483 Couples	Number of Couples	Per Cent of 1,186 Couples
	A	B	C	D	E	F	G	H	I
1st	1,783	90.2 ²	90.2	1,680	100.0	1,483	100.0	1,186	100.0
2nd	1,605	90.0	81.2	1,605	95.5	1,483	100.0	1,186	100.0
3rd	1,418	88.4	71.7	1,418	84.4	1,418	95.6	1,186	100.0
4th	1,276	90.0	64.6	1,276	76.0	1,276	86.1	1,186	100.0
5th	1,149	90.0	58.1	1,149	68.4	1,149	77.5	1,149	96.8
6th	1,034	90.0	52.3	1,034	61.5	1,034	69.7	1,034	87.2
7th	931	90.0	47.1	931	55.4	931	62.8	931	78.4
8th	837	90.0	42.4	837	49.8	837	56.5	837	70.6
9th	754	90.0	38.1	754	44.9	754	50.8	754	63.5
10th	678	90.0	34.3	678	40.4	678	45.8	678	57.2

¹ The data for the first, second, and third pregnancies are from Appendix Tables A, C, and D. Those for subsequent pregnancies assume a 10 per cent decrease after each pregnancy in the number of couples able to conceive, as explained in the text.

² The per cent of the 1,977 couples able to have a first conception.

Table 1. Couples able to have pregnancies of various orders (if contraception not practiced) among all couples, and among three groups assumed normal (or above) in fecundity.

2. The months of uncontrolled exposure required by each couple for the first, second, and each subsequent conception,

3. The duration of the first, second, and each subsequent pregnancy (with an allowance for the puerperium), assuming no illegal abortion,

4. The ratio of live born children to pregnancies, by order of pregnancy, assuming no illegal abortion.

The proportion of the couples studied who would have had a first, second, and third pregnancy if contraception had not been practiced, and the number of months of exposure without

reasons of separation or sickness), and "free period" (avoiding coitus for a few days before and after the supposed time of ovulation) are classified as contraceptive practices in this analysis. Douching shortly after coitus also is considered a contraceptive practice on an "action" basis, even for the wives who insisted that it was done only for cleanliness and not to prevent conception. If motivations were being analysed (as in other articles in this series) douching "for cleanliness only" would not be considered a contraceptive practice. Lactation is not considered a contraceptive practice here even though it was prolonged because the wife believed it would lessen the risk of conceiving.

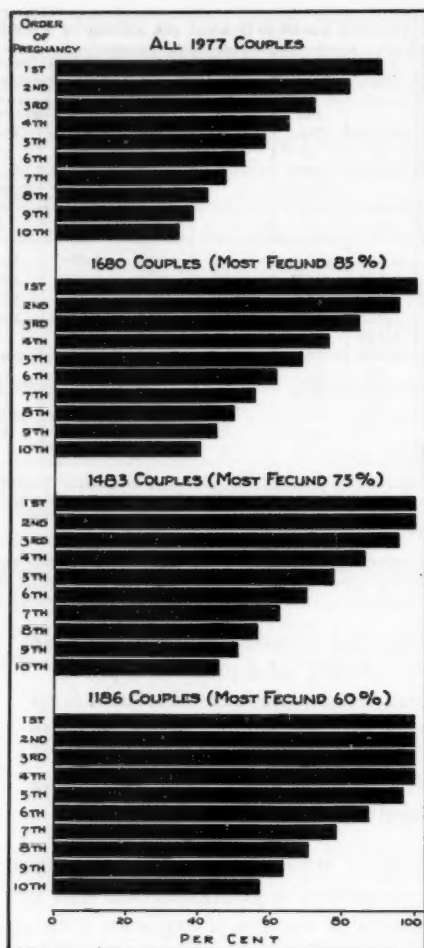


Fig. 1. Estimated percentages of couples able to have given numbers of pregnancies if no contraceptives were used.

Estimates are presented for all couples in the Indianapolis Study and for couples classified as "normal or above" in fecundity under three different assumptions. (See Table 1.)

contraception which would have been required for each conception, are estimated from the specific information about the various couples according to a procedure explained in the Appendix. The estimates indicate that approximately 90 per cent of the 1,977 couples would have had a first pregnancy, 81 per cent a second, and 72 per cent a third. (See Table 1, Column C.) The number of couples that had three (or more) conceptions and did not use contraceptives at all times after the third is too small to provide a basis for estimating in the same way the ability to have higher order pregnancies. In consequence these estimates are based on the relationships observed for the first three pregnancies, namely, that (a) 90.2 per cent of all couples could have had a first

pregnancy, (b) 90 per cent of those able to have a first could have had a second, and (c) 88.4 per cent of those able to have a second could have had a third. (See Table 1, Column B.) In view of the similarity of these percentages it is assumed that 90 per cent of the couples able to have a third pregnancy could have had a fourth, 90 per cent of those able to have a fourth could have had a fifth, etc. In other words, it is assumed that 64.6 per cent of all couples could have had a fourth pregnancy, 58.1 per cent a fifth, 52.3 per cent a sixth, 47.1 per cent a seventh, 42.4 per cent an eighth, 38.1 per cent a ninth, and 34.3 per cent a tenth.⁷ (See Figure 1.)

Table 2. Couples able to conceive, by months of exposure required for first conception, second conception, and third conception, if contraception not practiced.¹

MONTHS OF EXPOSURE ²	FIRST PREGNANCY		SECOND PREGNANCY		THIRD PREGNANCY	
	Number of Couples	Per Cent	Number of Couples	Per Cent	Number of Couples	Per Cent
	A	B	C	D	E	F
1	598	33.5	169	10.5	196	13.8
2	211	11.8	167	10.4	146	10.3
3	165	9.3	108	6.7	115	8.1
4	87	4.9	131	8.1	109	7.7
5-6	156	8.8	181	11.3	213	15.0
7-9	108	6.1	223	13.9	129	9.1
10-12	150	8.4	152	9.5	88	6.2
13-16	61	3.4	150	9.3	118	8.3
17-24	37	2.1	86	5.4	125	8.8
25-48	113	6.3	123	7.7	139	9.8
49-84	44	2.5	83	5.2	32	2.3
85+	53	3.0	32	2.0	8	0.6
ALL COUPLES	1,783	100.0	1,605	100.0	1,418	100.0

¹ See Appendix for an explanation of the procedure followed in obtaining these estimates.

² Because "months of exposure" was coded to the nearest whole number the line for 1 month includes periods of less than 1.50 months, that for 2 months includes periods of 1.50 to 2.50 months, that for 3 months includes periods of 2.51 to 3.49 months etc.

⁷ The computations for this article were carried to more decimal places than are shown in the text or tables, and each figure was rounded independently. In consequence, what appear to be arithmetic errors occur in several places. For example, Table 1, Column A shows 1,276 couples able to have a fourth pregnancy and 90 per cent of them, or 1,149, able to have a fifth. This appears incorrect because $9 \times 1,276 = 1,148.4$. The original calculations are $1,418.2 \times .9 = 1,276.4$ and $1,276.4 \times .9 = 1,148.8$. The latter is rounded to 1,149.

A high proportion of the couples able to have had a first pregnancy would have conceived shortly after marriage if contraceptives had not been used—over one-third within six weeks and over half within $3\frac{1}{2}$ months. (See Table 2, Columns A and B.) The proportion that would have conceived during each additional month is small, however, being approximately 5 per cent during the fourth month, and less than one per cent during most months after the first year. Nevertheless, nearly 12 per cent of the couples would not have conceived during the first two years of marriage but would have had at least one conception at a later date.

Most couples not using contraceptives require a longer period for the second and third conceptions than for the first, presumably because most wives do not resume ovulation until two or more months after the end of a pregnancy. Among the couples in this study that are classified as able to have a second or third pregnancy less than 14 per cent could have conceived for the second or third time within six weeks of the end of the preceding puerperium,⁸ compared with 33.5 per cent that could have conceived within 6 weeks of marriage. (See Figure 2.) Six weeks to 6 months of uncontrolled exposure would have been sufficient for the second and third conceptions of over one-third of the couples, and 6 months to 2 years for about one-third. The proportion requiring more than two years of exposure in order to conceive is slightly larger for the second and third conceptions (14.9 and 12.7 per cent) than for the first (11.8 per cent).

A large majority of the pregnancies not terminated by illegal abortion were reported to have lasted nine months, namely, 84.3 per cent of the first pregnancies, 86.3 per cent of the second, 80.3 per cent of the third, 82.9 per cent of the fourth, and 77.6 per cent of those of higher order.⁹ (See Table 3.) Related to the above is the high proportion of the pregnancies terminated

⁸ It is assumed that the puerperium lasts one month after the end of each pregnancy.

⁹ The 84 pregnancies reported as terminated by illegal abortion are disregarded here because these proportions are used for estimating the impact of impaired fecundity on birth performance. These 84 pregnancies constituted 2.2 per cent of all

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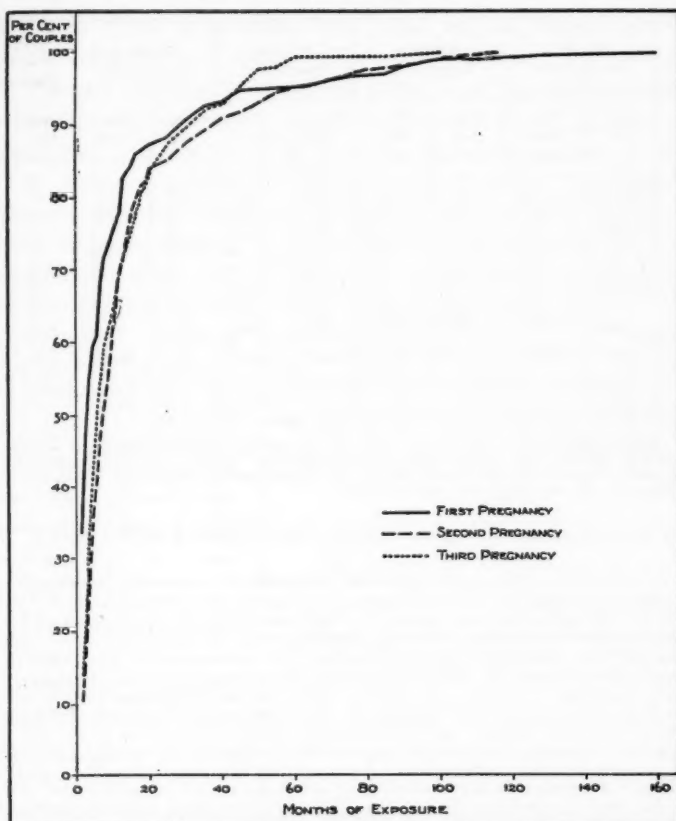


Fig. 2. Percentages of couples requiring less than specified number of months of noncontraceptive exposure for first, second, and third pregnancies. The cumulative percentages are for couples able to have a pregnancy of the specified order and are based on more detailed data than those shown in Table 2.

legally which resulted in a live birth (or twins), namely, 90.8 per cent of the first pregnancies, 90.4 per cent of the second, 83.4 per cent of the third, 84.6 per cent of the fourth and 81.2 per cent of the fifth pregnancies. The reported durations of these pregnancies are as follows: 37 one month, 30 two months, 13 three months, and 4 four months.

The few pregnancies reported as lasting ten months are included with those reported as lasting nine months.

MONTHS	FIRST PREGNANCY		SECOND PREGNANCY		THIRD PREGNANCY		FOURTH PREGNANCY		FIFTH AND SUBSEQUENT PREGNANCIES	
	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent
1	11	.7	13	1.1	4	.7	1	.4	4	2.4
2	30	1.8	47	4.1	27	4.9	12	5.1	5	2.9
3	43	2.6	27	2.3	31	5.7	7	3.0	7	4.1
4	17	1.0	9	.8	13	2.4	3	1.3	7	4.1
5	7	.4	2	.2	5	.9	5	2.1	3	1.8
6	17	1.0	9	.8	1	.2	3	1.3	2	1.2
7	55	3.3	5	.4	7	1.3	2	.9	2	1.2
8	79	4.8	45	3.9	20	3.7	7	3.0	8	4.7
9	1,386	84.3	992	86.3	439	80.3	194	82.9	132	77.6
TOTAL	1,645	100.0	1,149	100.0	547	100.0	234	100.0	170	100.0

Table 3. Pregnancies by duration in months and ordinal number.¹

¹ Eighty-four pregnancies which were terminated by illegal abortion are excluded because of the use made of the percentages in the text. None of these pregnancies was reported to have lasted more than 4.5 months. Forty-seven pregnancies which were in progress at the interview also are excluded.

per cent of those of higher order. (See Figure 3 and Table 4.¹⁰)

¹⁰ As shown in Table 4, the proportion of pregnancies terminating in miscarriage (unintentional abortion) increases from 6.7 per cent for first pregnancies to 15.9 per cent for fifth and subsequent pregnancies combined. This situation appears at first glance to differ widely from that among the women who had attended a birth control clinic and were studied by Stix and Notestein. The latter found "no consistent variation in the proportion of stillbirths or spontaneous abortions by order of pregnancy, except that both appeared to be slightly higher in first pregnancies than in later ones." (See Stix, R. K. and Notestein, F. W.: *CONTROLLED FERTILITY*. Baltimore, The Williams and Wilkins Company, 1940, pp. 82-83.) The actual proportions of pregnancies terminated by spontaneous abortions in those data extended from only 4.7 per cent for fifth pregnancies to 6.8 per cent for first pregnancies. Much of the difference disappears, however, when the Stix-Notestein data are made more comparable with the Indianapolis data by eliminating the illegal abortions from the percentage bases. The range then extends from 7.2 per cent for first pregnancies to 10.2 per cent for sixth and later pregnancies, but with little or no relation of the intermediate proportions to order of pregnancy.

It is possible that the more marked relation of miscarriages to order of pregnancy in the Indianapolis data is due in part to the erroneous reporting of illegal abortions as miscarriages. As previously noted, only 84 pregnancies (2.2 per cent of the total number) were reported as terminated by illegal abortion, which seems unduly low in comparison with the results of other studies. Most of the latter, however, relate to birth control clinic patients, a highly selected group, or to small samples and areas not fully comparable with Indianapolis. After reviewing available data and taking their deficiencies into consideration, Wiehl concluded that possibly about 5 per cent of the pregnancies of urban white married women in this country are illegally aborted. This percentage probably varies significantly from city to city, depending on a wide variety of factors. (See Wiehl, Dorothy G.: *A Summary of Data on Reported Incidence of Abortion*. The Milbank Memorial Fund Quarterly, January, 1938, xvi, No. 1, pp. 80-88.)

Although these proportions are based on the experience of couples regardless of contraceptive practice, they are used in the present analysis for estimates concerning normal fecundity in the absence of contraceptive practice. This seems justified since the available evidence suggests that, if illegal abortions are excluded, there is no relationship between (a) the use of contraceptives, and (b) the duration of pregnancies of given order or the proportion of pregnancies of given order terminating in live births.¹¹

The foregoing distributions do not automatically subdivide the 1,977 couples into (a) those that were below normal in their ability to produce living children and (b) those that were normal or above normal, but they do provide a basis for exercising judgment as to where the dividing point should be established. Because there are no fixed rules regarding the proportion of cases that should be classified as normal, above normal, and below normal in various distributions, it is desirable here to make three assumptions, two representing the probable extremes, and the third a medium position. One extreme is that a relatively small proportion (approximately 20 per cent) of the couples in each distribution were normal in fecundity, and

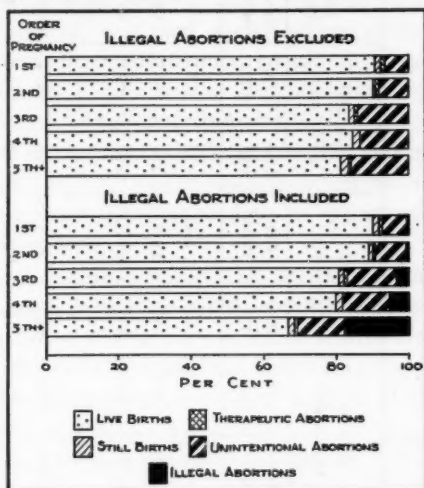


Fig. 3. Percentage distribution, by result, of pregnancies of specified order experienced by couples in the Indianapolis Study. (See Table 4.)

¹¹ If the couples in this study (excluding those who terminated their first pregnancy by illegal abortion and those whose first pregnancy was in progress at the

(Continued on page 193)

Table 4. Pregnancies by type of termination and ordinal number.¹

TERMINATION	FIRST PREGNANCY		SECOND PREGNANCY		THIRD PREGNANCY		FOURTH PREGNANCY		FIFTH AND SUBSEQUENT PREGNANCIES	
	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent
Illegal	7	.4	8	.7	19	3.4	13	5.3	37	17.9
Legal	1,645	99.6	1,149	99.3	547	96.6	234	94.7	170	82.1
All Pregnancies	1,652	100.0	1,157	100.0	566	100.0	247	100.0	207	100.0
Pregnancies Terminated Legally										
One Live Birth	1,488	90.5	1,028	89.5	449	82.1	194	82.9	131	77.1
Live Born Twins	5	.3	11	1.0	7	1.3	4	1.7	7	4.1
Stillbirth	26	1.6	3	.3	9	1.6	5	2.1	4	2.4
Miscarriage (Unintentional Abortion)										
	110	6.7	96	8.4	77	14.1	31	13.2	27	15.9
Therapeutic Abortion	16	1.0	11	1.0	5	.9	—	—	1	.6
TOTAL	1,645	100.0	1,149	100.0	547	100.0	234	100.0	170	100.0

¹ Pregnancies in progress at the interview are excluded. Two pregnancies which produced one live born and one still-born twin are included with those producing one live birth.

relatively large proportions (approximately 40 per cent each) above normal and below normal. The other extreme is that a relatively large proportion (approximately 70 per cent) of the couples in each distribution were normal, and relatively small proportions (approximately 15 per cent each) above normal and below normal. The medium assumption considers 50 per cent of the couples as normal, 25 per cent as above normal, and 25 per cent as below normal. Since the normal and above normal groups are combined in this analysis, 1,186 couples (60 per cent of the 1,977 couples studied) were normal or above according to the first assumption, 1,680 according to the second, and 1,483 according to the third.

The application of these percentages may be illustrated with reference to the first pregnancy. The 1,186 couples who are classified as normal (or above) in ability to have a first conception on the 60 per cent basis include the 1,090 who would have conceived within five months of marriage,¹² and 96 of the

interview) are grouped by their use of contraceptives prior to the first conception, the distribution of first pregnancies by type of termination is as follows:

USE OF CONTRACEPTIVES	NUMBER OF FIRST PREGNANCIES	PER CENT TERMINATING IN			
		Live Birth	Still Birth	Unintentional Abortion	Therapeutic Abortion
Not Used Before First Conception	525	90.9	1.5	7.0	.6
Used Before First Conception	1,120	90.7	1.6	6.5	1.2
Conception Occurred in Spite of Contraceptives	647	89.8	1.9	7.4	.9
Conception Occurred After Contraceptives were Discontinued	473	92.0	1.3	5.3	1.5
ALL COUPLES	1,645	90.8	1.6	6.7	1.0

The variations between the groups in the percentage of pregnancies ending in live births are not significant. (The 34 pregnancies producing live born twins and the two pregnancies producing one live born and one stillborn twin are included in the "Live birth" column.)

¹² Table 2 shows 1,061 couples able to conceive within four months of marriage and 156 requiring five or six months. Of the latter 29 reported five months and 127 reported six months.

127 requiring six months. Similarly, the 1,680 classified as normal or above on the 85 per cent basis include the 1,676 who would have conceived within forty-two months, and four of the five requiring forty-three months. To set the upper and lower dividing points between normal and subnormal at six and forty-three months appears reasonable, for it is believed that few people would claim that any couples whose first pregnancy could begin within six months of marriage are below normal in

Table 5. Average number of months required for conception (if contraception not practiced) and for duration of pregnancy and puerperium, by order of pregnancy, for all couples and for three groups assumed normal (or above) in fecundity.

ORDER OF PREGNANCY	All 1,977 Couples		COUPLES ASSUMED NORMAL (OR ABOVE) IN FECUNDITY					
			1,680 Couples (85 Per Cent)		1,483 Couples (75 Per Cent)		1,186 Couples (60 Per Cent)	
	Months	Cumulative Months	Months	Cumulative Months	Months	Cumulative Months	Months	Cumulative Months
	A	B	C	D	E	F	G	H
1st Conception ¹	10.8	10.8	6.2	6.2	3.6	3.6	2.2	2.2
1st Pregnancy ²	9.4	20.2	9.8	16.0	10.0	13.6	10.0	12.2
2nd Conception ¹	13.9	34.1	13.9	29.9	9.1	22.7	5.5	17.7
2nd Pregnancy ²	9.4	43.5	9.4	39.8	9.9	32.6	10.0	27.7
3rd Conception ¹	11.4	54.9	11.4	50.7	11.4	44.0	6.2	33.8
3rd Pregnancy ²	9.0	64.0	9.0	59.7	9.0	53.0	10.0	43.8
4th Conception ¹	9.7	73.7	9.7	69.4	9.7	62.8	7.4	51.2
4th Pregnancy ²	9.2	82.8	9.2	78.6	9.2	71.9	9.6	60.8
5th Conception ¹	8.5	91.4	8.5	87.2	8.5	80.5	8.6	69.4
5th Pregnancy ²	9.0	100.4	9.0	96.2	9.0	89.5	9.0	78.4
6th Conception ¹	7.8	108.1	7.8	103.9	7.8	97.2	7.8	86.2
6th Pregnancy ²	9.0	117.1	9.0	112.9	9.0	106.2	9.0	95.2
7th Conception ¹	7.3	124.4	7.3	120.2	7.3	113.5	7.3	102.5
7th Pregnancy ²	9.0	133.4	9.0	129.2	9.0	122.5	9.0	111.5
8th Conception ¹	7.0	140.4	7.0	136.2	7.0	129.5	7.0	118.5
8th Pregnancy ²	9.0	149.4	9.0	145.2	9.0	138.5	9.0	127.5
9th Conception ¹	6.9	156.3	6.9	152.0	6.9	145.4	6.9	134.4
9th Pregnancy ²	9.0	165.2	9.0	161.0	9.0	154.3	9.0	143.4
10th Conception ¹	6.9	172.1	6.9	167.9	6.9	161.2	6.9	150.3
10th Pregnancy ²	9.0	181.1	9.0	176.9	9.0	170.2	9.0	159.3

¹ The average numbers of months of uncontrolled exposure required for conception (Columns A, C, E, and G) are computed from the distributions in Table 2.

² The average duration of the pregnancies (Columns A, C, E, and G) are computed from the distributions in Table 3. One month is added to allow for the puerperium.

³ Columns A, C, E and G are estimated as explained in Section IV of the Appendix.

their ability to have their first conception, or that any couples unable to conceive within forty-three months are normal in that respect. The medium estimate (75 per cent) includes the 1,476 couples who would have conceived within twelve months and seven of those requiring a thirteenth month.

If only the 1,186 couples needing six months or less to become pregnant for the first time, in the absence of preventive practices, are assumed to be normal (or above) in fecundity, the average number of months necessary for that conception is 2.2. (See Table 5, Column G.) But if the 1,680 couples able to have conceived within forty-three months are considered normal or above, the average number of months for such couples is 6.2. (See Column C.) The average for the medium assumption is 3.6 months.

The application of the assumptions regarding the dividing line between the subnormal and normal couples to the distribution of pregnancies by their duration is similar to the foregoing. The 1,186 couples include 66.5 per cent of the 1,783 couples who could have conceived, according to Table 1. Since 84.3 per cent of the first pregnancies not terminated by illegal abortion lasted nine months and 90.8 per cent ended in live births (Tables 3 and 4) it is assumed that the first pregnancies of all of the 1,186 couples would have been of this type in the absence of control measures. The 1,680 couples, in contrast, amount to 94.2 per cent of the 1,783 couples assumed able to conceive. In consequence they include the 93.9 per cent whose first pregnancy lasted five months or longer and some of the 1.0 per cent with a termination at four months. Similarly, they include the 90.8 per cent whose first pregnancy produced a live birth (or twins) and part of the 8.3 per cent with a stillbirth or a miscarriage. If pregnancies ending in illegal abortion are ignored, the average length of the first pregnancy (including the puerperium) was 9.4 months for all couples. It would be 9.8 months for the 1,680 couples, and 10.0 months for the 1,483 and the 1,186 couples. For all couples there were 911 live births per 1,000 first pregnancies. The corresponding ratio would be 966

for the 1,680 couples, and 1,004 (because of twins) for the 1,483 and the 1,186.¹³

The procedure for subsequent pregnancies is like that for the first except for the fact that according to the low estimates of fecundity (assuming 85 per cent of the couples to be normal or above) the 1,680 couples include the total number (1,605) classified as able to have had a second conception, and 75 of the 372 classified as unable to have done so. The number able to have had subsequent pregnancies decreases with order of pregnancy, only 678 being classified as able to have had a tenth pregnancy. (See Table 1, Column A.) In the medium estimate of fecundity, the 1,483 couples are assumed able to have had a first and second pregnancy but the group becomes smaller thereafter. (Column F.) In the high estimate, the decrease does not begin until after the fourth pregnancy. (Column H.)

The average number of months of uncontrolled exposure required for a conception of each order (assuming no use of contraceptives) and the average duration of each pregnancy are given in Table 5, Columns A, C, E, and G. The cumulative average numbers of months for successive events are given in Columns B, D, F, and H of the same table. According to the average experience of the 1,977 couples it would have taken 149.4 months to have eight pregnancies and 165.2 months to have nine. Since the period from marriage to interview averaged 157.3 months, each of the 837 couples in Table 1 assumed able to have had eight pregnancies would have had sufficient time for eight but the period remaining thereafter (7.9 months) would have been too short to complete the ninth pregnancy. If this remainder is pooled for the 754 couples¹⁴ able

¹³ It should be noted that the average number of months required for conception is shorter according to the high estimate of fecundity (based on 60 per cent of the couples) than it is according to the low, but that the reverse is true for the average duration of pregnancy. The latter tends to make the number of pregnancies in a given period smaller for the high estimate than for the low. Its effect on live births is offset by the direct relation between duration of pregnancy and proportion of pregnancies ending in a live birth.

¹⁴ 7.9 months for each of 754 couples gives a total of 5,978 months. Dividing it by 15.9 months (the time required for the ninth conception and pregnancy), gives 376.

to have a ninth and divided by the average number of months required for the ninth conception and pregnancy, it is found adequate for 376 pregnancies.

Among the 1,680 couples assumed normal (or above) in fecundity on the 85 per cent basis the 837 assumed able to have had eight pregnancies would have completed the eighth in 145.2 months and had 12.1 months remaining—still too short a period for the ninth conception and pregnancy. In the aggregate, however, there could have been 576 ninth pregnancies. Because of the shorter average period required for the first two conceptions, 754 of the 1,483 couples in the medium group would have had time for nine pregnancies, and 128 couples could have had a tenth. Similarly, 754 of the 1,186 couples would have had time for a ninth pregnancy and 596 could have had a tenth.

The total number of pregnancies that would be expected to occur if contraceptives were not used can be computed from the foregoing calculations of time requirements and the data in Table 1 regarding the proportion of couples assumed physiologically able to have a pregnancy of each order. The results for the couples assumed normal (or above) in fecundity are given in Table 6. The 1,977 couples would have had a total of 10,409 pregnancies, or 5,265 pregnancies per 1,000 couples.¹⁵ The low estimate for couples of normal fecundity (which assumes that 85 per cent of the couples are in this category at each period) is 6,252 pregnancies per 1,000 couples. The medium estimate is 7,076, and the high estimate is 8,468 (based on 60 per cent of the couples).

The number of live births per 1,000 couples is somewhat smaller than the number of pregnancies but the variations between the groups are somewhat larger—the cause in each case being pregnancy wastage. Among the 1,977 couples there would

¹⁵ According to Table 1, 1,783 of the 1,977 couples could have had a first pregnancy, 1,605 a second, 1,418 a third, 1,276 a fourth, 1,149 a fifth, 1,034 a sixth, 931 a seventh, and 837 an eighth. These numbers add to 10,033 pregnancies. In addition (as shown above) 376 couples could have had a ninth pregnancy, making a total of 10,409 pregnancies or 5,265 pregnancies per 1,000 couples.

have been 4,594 live births per 1,000 couples if no contraceptives has been used and no pregnancies aborted illegally. (See Table 6.) The corresponding figure is 5,507 for the 1,680 couples, 6,325 for the 1,483 couples, and 7,769 for the 1,186.^{1a}

The extent to which the fertility of the couples studied would have been reduced by impairments of fecundity if contraception and illegal abortion had not been practiced may be meas-

Table 6. Fecundity—number of pregnancies and live births if neither contraception nor illegal abortion was practiced—of all couples, and of three groups assumed normal (or above) in fecundity.¹

PREGNANCIES AND LIVE BIRTHS	ALL 1,977 COUPLES	COUPLES ASSUMED NORMAL (OR ABOVE) IN FECUNDITY		
		1,680 Couples (85 Per Cent)	1,483 Couples (75 Per Cent)	1,186 Couples (60 Per Cent)
	A	B	C	D
<i>Total Number of Pregnancies</i>	10,409	10,507	10,492	10,045
<i>Live Births</i>	9,083	9,254	9,379	9,216
<i>Rate per 1,000 Couples</i>				
<i>Pregnancies</i>	5,265	6,252	7,076	8,468
<i>Live Births</i>	4,594	5,507	6,325	7,769
<i>Percentage Reduction in Rate Due to Impairments of Fecundity²</i>				
<i>Pregnancies</i>	—	15.8	25.6	37.8
<i>Live Births</i>	—	16.6	27.4	40.9

¹ Based on Tables 2 and 5, as explained in text.

² The difference between the rates in Columns A and B (or A and C, or A and D) expressed as a percentage of the rate in Column B (or Column C, or Column D).

^{1a} It is interesting to compare the above estimates of the normal inherent capacity for reproduction with the actual performance of the six couples who were not obviously subnormal in fecundity (except that two of these wives were sterilized shortly before the interview) and who did not resort to contraception or illegal abortion. These six couples had 38 pregnancies and 43 live births. The expected numbers are 51 pregnancies and 47 live births according to the high estimates of fecundity, 42 pregnancies and 38 live births according to the medium estimates, and 38 pregnancies and 33 live births according to the low estimates. The actual reproductive performance of these six couples, therefore, is the same as the low estimate with respect to pregnancies and between the medium and high estimates with respect to live births.

ured by comparing these pregnancy and birth rates for the 1,977 couples with those for the three groups of couples assumed normal (or above) in fecundity. In the absence of control measures, the defects in the reproductive system which prevent it from functioning normally would have reduced the birth rate by at least 16 per cent, probably by about 27 per cent, and perhaps by as much as 41 per cent. (*See Table 6.*)

In addition to knowing the average number of pregnancies and live births that would have occurred to all couples and to the couples of normal fecundity if neither contraception nor illegal abortion had been practiced, it would be of interest to estimate the distribution of the couples by the number of these events. In order to make such estimates it would be necessary to use the distributions rather than the averages for the number of months required for each conception and pregnancy, and to know the interrelation between these distributions. (For example, it would be necessary to know how the 598 couples needing one month for the first conception are distributed by months required for the second conception, and to have similar information for each other group.) The latter information is not available as yet. It is possible that the distribution for both the high, medium, and low estimates would show a few couples with 12 or more pregnancies, for a couple married 157 months and having twelve ten-month pregnancies (including one month for each puerperium) would have thirty-seven months for conceptions, or an average of slightly over three months for each conception.¹⁷ The lower limits are those in Table 1, however, for one of the basic assumptions is that all couples normal (or above) in fecundity can have one pregnancy (minimum estimate), two pregnancies (medium estimate), or four pregnancies (maximum estimate).

Before passing to the next section it should be pointed out again that the differences between the high, medium, and low

¹⁷ Three and one-half months was a sufficiently long period for more than 54 per cent of all the couples to have their first conception, 27 per cent to have their second, and 32 per cent to have their third. (*See Table 2, Columns B, D, and F.*) The proportions are higher for the couples assumed normal (or above) in fecundity.

estimates of the inherent power of normal reproduction are caused primarily by the variations in the proportion of couples classified as able to have a pregnancy of each order, and only secondarily by the variations in the number of months required for each conception and pregnancy. This results in part from the fact that there is relatively little difference in the average duration of pregnancy for the three groups of couples classified as normal or above in fecundity. Furthermore, it occurs in spite of the fact that in obtaining the estimates for all couples and for each of the three groups it is assumed that 10 per cent of the couples classified as able to have a fifth pregnancy were unable to have a sixth, 10 per cent of those able to have a sixth were unable to have a seventh, and so on. Ten per cent is believed to be the best proportion to use in view of the data for the first three pregnancies. But if 5 per cent (instead of 10 per cent) were used for all couples and for the high estimate of normal, the pregnancy rates for the two groups would be 5,771 and 9,614. This gives a reduction of 40.0 per cent because of defects in fecundity, which is only slightly larger than the 37.8 per cent decrease obtained on the 10 per cent basis. (See Table 6.) Similarly, assuming a 15 per cent decrease in this connection gives a reduction in the fertility rate of 36 per cent, which is only slightly less than the reduction on the 10 per cent basis. The effect of such changes is smaller for the medium and low estimates than for the high estimates.

Finally, it should be emphasized again that the three estimates of reproduction with normal fecundity are not based on the experience of the same 1,680, 1,483, or 1,186 couples throughout the period studied. Instead, the medium estimates (for example) give a composite picture of (a) the 1,483 couples who required the shortest period of uncontrolled exposure for the first conception, (b) the 1,483 couples whose first pregnancy ended in a live birth, (c) the 1,483 couples who required the shortest period for their second conception, etc. As pointed out this procedure is followed because it is feasible to array the 1,977 couples with respect to each of these events, and select the upper

60, 75, or 85 per cent, or any other proportion desired. In contrast, unless standards of accuracy are lowered it is not feasible to make a single array of the 1,977 couples with respect to all such events. If the latter were done it probably would show birth rates in the neighborhood of 5,200 for an identical group of 1,680 couples, 5,800 for an identical group of 1,483 couples, and 7,000 for an identical group of 1,186 couples.^{17a} These rates are 6 to 10 per cent below the rates of 5,507, 6,325, and 7,769 shown in Table 6 and based on the composite experience of the same numbers of couples selected independently for each conception and pregnancy.

**B. THE REDUCTION IN FERTILITY CAUSED BY CONTRACEPTION
AND ILLEGAL ABORTION AMONG COUPLES NORMAL
(OR ABOVE) IN FECUNDITY**

In estimating from the data at hand the difference between potential and actual fertility which would result from contraception and illegal abortion if no couples were subnormal in fecundity, it is not feasible to follow the procedure used in preparing the estimates of fecundity in Section A. There it was a relatively simple matter to list the wives conceiving during periods of uncontrolled exposure by the length of that exposure, for these facts can be determined fairly accurately. Moreover, the experience of these couples provides what appears to be a reasonable basis for distributing the couples whose pregnancies begin in spite of attempts at prevention. Some of the remaining couples have been sterilized, or have had long periods of uncontrolled exposure with no conception, and obviously should be classified as unable to conceive. Only the relatively few remaining couples present serious problems. The parallel procedure here would be to list the couples normal or above in fecundity by months required to conceive with their actual practice of contraception, and use this information as a basis for distributing the others. Unfortunately, there are no simple criteria for determining whether the couples who practice con-

^{17a} These estimates are based on the birth rate of 5,861 for the 1,444 couples classified as "relatively fecund," which is shown in Section V of the Appendix.

trapection throughout an interpregnancy interval are normal, or below or above normal, in fecundity at that time.

The most practical approach appears to be to identify and set aside the couples with the more serious impairments of fecundity, and ascertain the fertility of the remaining couples. Three estimates are made on this basis, utilizing as before the experience of 85, 75, and 60 per cent of the 1,977 couples and omitting respectively, the 297, 494, and 791 couples of lowest fecundity. In this case, however, the experience of the same couples is used throughout the entire period.

The numbers of couples with serious impairments of fecundity are given below, grouped by severity of impairment:¹⁸

1. Could not conceive	194
2. Could conceive, but could not carry fetus to term	19
3. Could conceive once, but not twice	178
4. Could conceive twice, but could carry only first fetus to term	3
5. Could conceive twice, but not three times	187
6. Could conceive three times, but could carry only first two fetuses to term	6
7. Could conceive and carry to term three times, but not more	142
8. Could conceive and carry to term four times, but not more	127
9. Could conceive and carry to term more than four times	1,121
10. Total	1,977

If the foregoing data are used in classifying the couples according to their inherent ability to reproduce, the 1,680 couples assumed to be normal (or above) in fecundity on the 85 per cent basis include all of the 1,977 couples except the 213 in groups 1 and 2, and 84 of the 178 in group 3. Among these 1,680 couples there were 2,227 pregnancies and 1,959 live births per 1,000 couples. (See Table 7, Column A.) The 1,483 couples normal (or above) on the 75 per cent basis include the 1,396

¹⁸ For a discussion of the basis for this grouping see the Appendix.

couples in groups 6 to 9 and 87 of the 187 in group 5. The rates for these 1,483 couples are 2,364 pregnancies and 2,074 live births per 1,000. The 1,186 couples normal (or above) on the 60 per cent assumption include the 1,121 in group 9 and 65 of the 127 in group 8. The high estimates of the normal rates obtained on this basis are 2,474 pregnancies and 2,159 live births per 1,000 couples.

A comparison between the foregoing estimates of reproduction which assume the actual incidence of contraception and illegal abortion, and the estimates in Section A which assume no contraception or illegal abortion, shows the importance of

Table 7. Fecundity and fertility of three groups of couples assumed normal (or above) in fecundity.

PREGNANCIES AND LIVE BIRTHS	COUPLES ASSUMED NORMAL (OR ABOVE) IN FECUNDITY		
	1,680 Couples (85 Per Cent)	1,483 Couples (75 Per Cent)	1,186 Couples (60 Per Cent)
	A	B	C
<i>Fecundity (Reproduction assuming no Contraception nor Illegal Abortion)¹</i>			
1. Number of Pregnancies	10,507	10,492	10,045
2. Number of Live Births	9,254	9,379	9,216
3. Pregnancies per 1,000 Couples	6,252	7,076	8,468
4. Live Births per 1,000 Couples	5,507	6,325	7,769
<i>Fertility (Actual Reproduction)²</i>			
5. Number of Pregnancies	3,742	3,505	2,934
6. Number of Live Births	3,293	3,076	2,561
7. Pregnancies per 1,000 Couples	2,227	2,364	2,474
8. Live Births per 1,000 Couples	1,959	2,074	2,159
<i>Percentage Reduction Due to Contra- ception and Illegal Abortion³</i>			
9. Pregnancies	64.4	66.6	70.8
10. Live Births	64.4	67.2	72.2

¹The data in this deck are from Table 6, Columns B, C, and D. The couples composing the group shown in each column are not the same throughout the period studied.

²Each group consists of the same couples at all times. Pregnancies in progress at the time of the interview are excluded.

³The difference between the rates in lines 3 and 7 (or 4 and 8) expressed as a percentage of the rates in line 3 (or 4).

these control measures in reducing the fertility of couples normal (or above) in fecundity. According to the low estimate, contraception and illegal abortion reduced the pregnancy rate of couples of normal fecundity by 64.4 per cent (from 6,252 to 2,227 per 1,000) and the birth rate by the same per cent (from 5,507 to 1,959 per 1,000 couples). (See Table 7.) The high estimates show somewhat larger decreases, namely, 70.8 per cent for pregnancies (from 8,468 to 2,474 per 1,000 couples) and 72.2 per cent for live births (from 7,769 to 2,159). Finally, the medium estimates show reductions of 66.6 per cent for pregnancies and 67.2 for live births.¹⁹

The estimates of the extent to which contraception and illegal abortion cause the actual fertility of couples normal (or above) in fecundity to be below their potential fertility may be compared with those in Section A showing the extent to which defects in the reproductive mechanism reduce fertility in the absence of control measures. The latter are substantially smaller. Thus, if contraception and illegal abortion had not been practiced, the impairments which existed would have lowered the pregnancy rate per 1,000 couples by at least 15.8 per cent and possibly by 37.8 per cent and the live birth rate by at least 16.6 per cent and possibly by 40.9 per cent, with 25.6 and 27.4 per cent as medium estimates. (See Table 6.) But contraception and illegal abortion together lowered the

¹⁹ A previous article indicated that among the 1,444 couples classified as "relatively fecund" during the field work, contraception as practiced reduced fertility 70.4 per cent below that expected in the absence of contraception but with the existing impairments in the fecundity of this "relatively fecund" group. See Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. VI. The Planning of Fertility. *The Milbank Memorial Fund Quarterly*, January, 1947, xxv, No. 1, p. 104 (Reprint p. 250). The more rigorous method described in Section V of the Appendix of this article shows reductions of 65.9 per cent in the pregnancy rate and 65.5 per cent in the birth rate, which should be more accurate than the foregoing.

In computing the hypothetical rates (assuming no contraception or illegal abortion) it is assumed that all pregnancies which would have begun would have been completed before the interview. To increase comparability, the actual pregnancy rates shown here exclude the 47 pregnancies in progress at the time of the interview. In consequence, these actual pregnancy rates are slightly below those including all pregnancies, which have been referred to in previous articles in this series. These actual pregnancy and birth rates also exclude adopted children, who are included with pregnancies and births in rates which have been referred to in previous articles in connection with discussions of family planning.

pregnancy rate of couples normal (or above) in fecundity by between 64.4 and 70.8 per cent and the live birth rate by between 64.4 and 72.2 per cent. The latter reductions are approximately two to four times the size of the former.

It may be argued that the influence of contraception and illegal abortion is exaggerated by the above-mentioned data. The reason (pointed out above) is that the medium estimates of fecundity in Section A are based on the combined experience of (a) the 1,483 couples who could have conceived with the least delay after marriage, (b) the 1,483 couples whose first pregnancy would have ended in a live birth, (c) the 1,483 couples who could have had their second pregnancy with the least delay after their first, etc. The experience of some couples is used for one of these events but not for others. In contrast, the 1,483 couples used in obtaining the medium estimate in this section form a constant group, selected on the basis of capacity to reproduce throughout the period studied. The bias due to this procedural difference is small, however, for it is very unlikely that the use of a constant group in Section A would reduce the medium estimate of the pregnancy rate from 7,076 per 1,000 couples to less than 6,500, or that of the birth rate from 6,325 to less than 5,800.²⁰ On this basis the reduction in fertility due to control measures would be 63.6 per cent for pregnancies and 64.2 per cent for live births instead of 66.6 and 67.2, respectively, which is still far greater than the reduction due to impaired fecundity.

C. THE REDUCTION IN FERTILITY DUE TO IMPAIRED FECUNDITY, WITH THE ACTUAL PRACTICE OF CONTRACEPTION AND ILLEGAL ABORTION

In Section A the estimated reproduction rates of couples of normal (or higher) fecundity were compared with those of all couples, assuming no contraception or illegal abortion. Section B was limited to couples of normal fecundity, their estimated

²⁰ The estimates for the 1,444 "relatively fecund" couples shown in Section V. of the Appendix are 6,564 and 5,861, respectively.

rates assuming no control measures being compared with their actual rates. This section contrasts the actual rates of couples of normal fecundity with those of all couples. The desire here is to estimate the extent to which defects in the reproductive system reduced fertility with contraception and illegal abortion practiced as they were by the group in question.

The statistical groundwork for this section is laid in the preceding, where it is estimated that the couples normal (or above) in fecundity, and using contraception and illegal abortion as they did, had a pregnancy rate of between 2,227 and 2,474 and a birth rate of between 1,959 and 2,159 per 1,000 couples, depending on where the line is drawn between normal and sub-normal fecundity. (See Table 8, Columns B and D.) Medium estimates are 2,364 pregnancies and 2,074 births. For all couples the pregnancy rate is 1,937 and the birth rate 1,699. (Column A.) It appears, therefore, that defects in the reproductive

Table 8. Fertility—actual number of pregnancies and live births—of all couples and of three groups assumed normal (or above) in fecundity.

PREGNANCIES AND LIVE BIRTHS	ALL 1977 COUPLES	COUPLES ASSUMED NORMAL (OR ABOVE) IN FECUNDITY		
		1,680 Couples (85 Per Cent)	1,483 Couples (75 Per Cent)	1,186 Couples (60 Per Cent)
	A	B	C	D
<i>Total Number of</i>				
Pregnancies ¹	3,829	3,742	3,505	2,934
Live Births	3,358	3,293	3,076	2,561
<i>Rate per 1,000 Couples</i>				
Pregnancies ¹	1,937	2,227	2,364	2,474
Live Births	1,699	1,959	2,074	2,159
<i>Percentage Reduction Due to</i>				
<i>Impairments of Fecundity²</i>				
Pregnancies ¹	—	13.0	18.0	21.7
Live Births	—	13.3	18.1	21.3

¹ Excluding pregnancies in progress at the time of the interview.

² The difference between the rates in Columns A and B (or A and C, or A and D) expressed as a percentage of the rates in Column B (or C, or D).

mechanism reduced the pregnancy rate by between 13.0 and 21.7 per cent and the birth rate by between 13.3 and 21.3 per cent, with 18.0 and 18.1 per cent as medium estimates for pregnancies and births, respectively. In other words, if the impairments of fecundity had not existed, the number of pregnancies for the group studied would have been larger by between 15.0 and 27.7 per cent and the number of live births larger by between 15.3 and 27.1 per cent, with 22.0 and 22.1 per cent as medium estimates for pregnancies and births.²¹

Because of the importance of estimating correctly the extent to which defects of the reproductive system reduce fertility with the actual resort to contraception and illegal abortion, it is of interest to compare the foregoing estimates with the opinions of the wives regarding the number of additional children they would have had if they and their husbands had been of normal fecundity. This question was asked directly of the wife if the couple was classified as "relatively sterile" at the time of interviewing.²² Closely related information was obtained from

²¹ It should be noted that the estimated decrease in the birth rate caused by sterility and low fecundity is significantly larger when based on the hypothetical situation of no contraception or illegal abortion (16.6 to 40.9 per cent in Table 6) than when based on the actual conditions with respect to these events (13.3 to 21.3 per cent in Table 8). Although the former is of theoretical interest, the latter is of more practical importance.

²² For interviewing purposes couples were classified as "relatively sterile" if they had three or fewer live births and knew (or had good reason to believe) that (a) they could not conceive during a period of at least twenty-four consecutive months (if never pregnant) or thirty-six consecutive months (if pregnant one or more times), or (b) if conception occurred the pregnancy would end in wastage. Other couples were classified as "relatively fecund." In the absence of more positive information, coitus without some form of contraception "always" or "usually" and not resulting in pregnancy during the periods mentioned was considered an adequate reason for classifying a couple as "relatively sterile." The 533 couples classified as "relatively sterile" during the field work include the following numbers of those classified as below normal in fecundity in this section: low assumptions, 284 of 297; medium assumptions, 447 of 494; high assumptions, 533 of 791. The differences result in part from the constant use of contraceptives. For example, 121 couples practiced contraception "always" or "usually" during the period studied, thought they could have conceived at any time, and were classified as "relatively fecund" when interviewed. Subsequent analysis of the data shows that 513 couples practiced contraception similarly for varying periods beginning at marriage and then tried to have a child, and that 52 found they could not do so. It is believed that 13 of the 121 couples would have had the same experience if they had stopped contraception. In consequence, in obtaining the low estimates of fecundity in this section these 13 couples are added to the 284 "relatively sterile" couples who could not conceive, raising the total to 297.

the small number of "relatively fecund" couples whose fertility may have been reduced by impaired fecundity.

Among the 533 "relatively sterile" couples there were only sixty-one wives who thought that they would not have borne more children if they could have done so. Twenty-three of these had had one or more conceptions after the last wanted by the wife or husband (or both). A few of the others had had no conceptions; the rest had wanted the children that had been born, but no more.

Of the 462 wives who thought they had had fewer children than they would have had if they and their husbands had been normal in fecundity, 146 (nearly one-third) set the reduction at one child (or "one or two"), 169 (over one-third) set it at two, and 147 (nearly one-third) set it at "two or three" or more. (See Table 9.) The total reduction amounts to approximately 1,024 children. As would be expected there is an inverse relation between the actual number of living children and the number

Table 9. The "relatively sterile" couples, by the actual number of children living at the interview and by the number of additional children the wife thinks there would have been if the couple had been normal in fecundity.¹

NUMBER OF ADDITIONAL CHILDREN IF NORMAL IN FECUNDITY	ACTUAL NUMBER OF LIVING CHILDREN				ALL COUPLES	
	0	1	2	3	Number	Per Cent
0	13	8	26	14	61	11.7
0 or 1 (Perhaps 1)	—	—	8	—	8	1.5
1	—	66	33	4	103	19.7
1 or 2 (At least 1)	17	15	3	—	35	6.7
2	103	41	23	2	169	32.3
2 or 3 (At least 2)	25	6	1	—	32	6.1
3	27	23	—	—	50	9.6
3 or 4 (At least 3)	8	2	—	—	10	1.9
4	39	—	—	—	39	7.5
4 or 5 (At least 4)	6	—	—	—	6	1.1
5 or More	6	—	4	—	10	1.9
Not Reported	8	2	—	—	10	—
ALL COUPLES	252	163	98	20	533	100.0

¹ Adopted children are not counted. Thus, a couple with two adopted children who reported they would have no additional children is classed as a childless couple who would have two additional children.

that the wife thought were prevented by impairments. Only two of the twenty wives with three children thought they would have had at least two additional children if fecundity had been normal, but 214 of the 252 childless wives thought they would have had two or more children if they could have done so. In contrast, fourteen of the twenty wives with three children, but only thirteen of the 252 childless wives, thought that family size had not been affected by sterility or low fecundity.

Although most of the 1,444 "relatively fecund" couples could have had a child every two or three years throughout their married life there were forty who were sterilized for medical reasons.²³ It is almost certain that fourteen of these forty would have had no more children prior to the interview if their ability to reproduce had been normal, for eleven had been sterilized within a year, and three had not wanted additional children and had practiced contraception successfully for a long period. Among the remaining twenty-six couples there are 14 who said they wanted additional children and probably would have had eighteen to twenty-two more, and twelve who said they had all they wanted but probably would have had twelve to sixteen more in spite of their attempts at prevention. Although some of the 1,404 "relatively fecund" couples that had not been sterilized for medical reasons were somewhat below normal in their ability to reproduce, their use of contraceptives indicates that these defects did not have a significant effect in reducing the number of children.

Combining the 1,024 additional children that the "relatively sterile" wives thought would have been born if fecundity had been normal and the foregoing estimates of thirty to thirty-eight for the "relatively fecund" couples gives a total of 1,054 to 1,062. This is almost one-third of the 3,226 children that were living when the couples were interviewed. In other words,

²³ In each of these cases sterilization occurred either less than three years before the interview or after there had been at least four live births, otherwise the couple would have been classified as "relatively sterile." The forty couples do not include three that were sterilized merely because they preferred it to continuing to practice contraception.

the foregoing material indicates that impairments of the reproductive system reduced the number of children by nearly 25 per cent.

The fact that the foregoing estimate exceeds the medium estimate of 18.1 per cent for live births in Table 8 does not prove that the latter is too low. On the contrary, there are two reasons for thinking that 25 per cent is too high. One is the implicit assumption by the wives that the number of additional children mentioned could have been obtained by the same number of additional pregnancies. In practice, however, approximately 10 per cent of the additional pregnancies would have ended in wastage, and part of them would not have been made up by still more pregnancies.

A second and much more important reason is the well-known tendency to exaggerate in replying to such a question. Some idea of the importance of this bias may be obtained by comparing the number of children that the 244 childless "relatively sterile" wives said they would have had—619 (or 2,537 per 1,000 couples)—with the actual number of children among the "relatively fecund" couples—1,944 per 1,000 couples. The latter rate is 23.4 per cent below the former. Since there is no reason for expecting a difference between these two groups with respect to size of family, this comparison indicates that the opinions of the childless "relatively sterile" wives regarding the number of children they would have borne should be reduced by 23.4 per cent to allow for "wishful thinking." Similarly, the 279 "relatively sterile" wives with one or more children said they would have had 798 children—2,860 per 1,000 couples—if they could have done so. This rate would have to be reduced by 25.0 per cent to make it equal the actual rate of 2,144 per 1,000 for the "relatively fecund" wives with one or more children.

Making the above-mentioned allowances for the tendency of "relatively sterile" wives to overstate the number of children that they would have had with normal fecundity is equivalent to saying that in the absence of impairments the reproductive

rates for all of the couples studied would have been slightly above those for the "relatively fecund" couples. In this group there were 2,239 pregnancies, 2,023 live births, and 1,944 living children per 1,000 couples. (See Table 10, Column B.) Allowing generously for the effect of the minor impairments which were found in this group would not raise these rates more than 3 per cent, *i.e.*, to more than 2,306, 2,084, and 2,002.²⁴ For all couples, however, the corresponding rates are 1,937, 1,699, and 1,632. On this basis the defects of the reproductive system lowered the pregnancy rate by 16.0 per cent, and the birth rate and the number of children by 18.5 per cent, with contraception and abortion practiced as they would have been if the defects had not existed. These percentages agree closely with the medium estimates in Table 8, which would be expected in view of the fact that the 494 couples classified as below normal in fe-

Table 10. Fertility of all couples, "relatively fecund" couples, and "relatively sterile" couples.

FERTILITY	ALL 1,977 COUPLES	1,444 "RELATIVELY FECUND" COUPLES		533 "RELATIVELY STERILE" COUPLES
		Actual	Desired ¹	
	A	B	C	D
<i>Rate per 1,000 Couples</i>				
Pregnancies ²	1,937	2,239	2,306	1,118
Live Births	1,699	2,023	2,084	820
Living Children	1,632	1,944	2,002	786
<i>Per Cent Reduction in Rate Due to Impaired Fecundity³</i>				
Pregnancies ²	16.0	2.9	—	51.5
Live Births	18.5	2.9	—	60.6
Living Children	18.5	2.9	—	60.7

¹ Includes a maximum (3 per cent) allowance for the pregnancies, births, and children that were prevented by the defects of the reproductive system which occurred among "relatively fecund" couples.

² Pregnancies in progress at the time of the interview are excluded.

³ The difference between the rates in Columns A and C (or B and C, or C and D) expressed as a percentage of the rate in Column C.

²⁴ The increase of 30 to 38 live births (mentioned above) amounts to 0.9 to 1.2 per cent. It appears quite unlikely that the allowance should exceed 3 per cent.

cundity in that connection include 447 of the 533 "relatively sterile" couples.

The foregoing estimates indicate that if the impairments of fecundity had never existed the birth rate would have exceeded the actual figure by about 22 per cent.²⁵ It should be emphasized, however, that the discovery and perfection of means of treating these impairments so as to permit normal reproduction would not increase the birth rate to this extent. The main reason is that many couples with subnormal fecundity would not take advantage of the curative treatments, even if they could do so at no expense. Some of them seem to believe that their condition is "natural" or represents "God's will," and that if they were meant to have a child (or additional children) they would do so. Many of the wives apparently dislike to consult a physician about reproductive problems and undergo the examinations that they think would be suggested, consequently they do not do so unless forced to it by pain or sickness. Some of those who are examined do not take the treatments that are suggested, especially if an operation is involved. Husbands are less likely than wives to consult physicians, ostensibly because they are sure that it is the wife who is at fault, but in part because at heart they fear that if they were found defective it would be a reflection on their manhood. In other words, many of the wives and husbands who say they want more children but cannot have them do not want them in sufficient degree to take the steps which might well make their wish come true.

The extent to which control measures and defects of the reproductive system independently and in combination caused the actual reproduction rates to be below the normal capacity to reproduce may be seen by comparing Tables 6, 7, and 8, and is shown graphically in Figure 4. The medium estimate of the normal reproductive ability of the couples in this study during the twelve to fifteen years since marriage is a birth rate of 6,325 per 1,000. Impairments would have lowered this rate to 4,594

²⁵ The actual birth rate in Table 8 is 1,699, and the medium estimate assuming no impairments of fecundity is 2,074. The former is 18.1 per cent smaller than the latter; the latter is 22.1 per cent larger than the former.

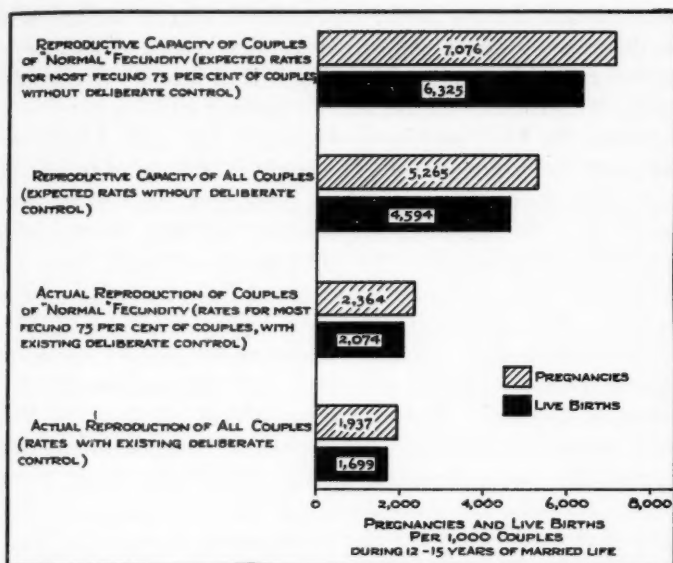


Fig. 4. Reductions in pregnancy and live birth rates due to low fecundity and contraception. (See Tables 6, 7, and 8.)

(a reduction of 27.4 per cent) if no control measures had been used. If all couples had been normal (or above) in fecundity, contraception and abortion would have caused the birth rate to be 2,074, or 67.2 per cent below the estimated normal capacity. Actually, because of impairments and deliberate control, the birth rate was 1,699, or 73.1 per cent below capacity. In other words, partly because of defects in the reproductive system, but primarily because of contraception and illegal abortion, the number of births to the couples studied was only 26.9 per cent of the number that could have occurred if all of the couples had been normal (or above) in fecundity.

D. CONTROL MEASURES AND IMPAIRED FECUNDITY AS CAUSES OF CHILDLESSNESS

In addition to analysing the relative importance of control

measures and defects in the reproductive system as causes of the difference between the actual fertility rates and the reproductive capacity of normal couples, it is of interest to consider briefly their relative importance in causing childlessness.

Among the 1,977 couples in this study 322, or 16.3 per cent, had never had a pregnancy. The analysis of the ability to conceive, made in the first part of the Appendix, leads to the conclusion that 194 of the 322 couples (60.2 per cent) were unable to become pregnant, and 128 (39.8 per cent) could have had one or more pregnancies but prevented them by using contraceptives. This classification gives a high estimate of the importance of sterility and a low estimate for control measures, because it ignores the fact that among the 194 couples classified as unable to conceive there are fifteen who didn't want children, and consequently practiced contraception "always" before they learned they were definitely sterile. Combining these fifteen couples with the 128 gives a total of 143—44.4 per cent of the 322—that would not have had a pregnancy even if they could have done so. This is a high estimate of the importance of control measures in preventing conception, and leaves 55.6 per cent as a low estimate of the importance of defective fecundity. Medium estimates of 42.1 per cent for voluntary action and 57.9 per cent for physiological causes are obtained by dividing equally between the two groups the fifteen couples influenced jointly by both types of causes.

Estimates of the influence of impairments and control measures as causes of childlessness differ from those for ability to conceive, because of pregnancy wastage. This affects the classification not only of the sixty couples who conceived but had no live birth, but also that of seven of the 322 who did not conceive. These seven could have conceived but did not do so, and are among the 128 classified correctly as never pregnant because of control measures. In analysing ability to bear a child (as distinguished from ability to conceive) they need to be treated differently. Three of the seven couples wanted children, and prevented conception only because a physician said it would

be physiologically impossible for the wife to produce a living child. For these couples childlessness was involuntary. (See Table 11, line 6.) The other four wives were given the same medical advice in connection with treatments for "female trouble," but said they and their husbands previously had planned not to have children. These couples may be classified

Table 11. Couples with no live birth because of control measures and because of impaired fecundity, according to three assumptions regarding joint causation.¹

ABILITY TO HAVE AND DESIRE FOR A CHILD	TOTAL	BECAUSE OF CONTROL MEASURES			BECAUSE OF IMPAIRED FECUNDITY		
		High	Medium	Low	High	Medium	Low
	A	B	C	D	E	F	G
1. Could Not Conceive	194	15	7.5	—	194	186.5	179
2. Wanted a Child	167	—	—	—	167	167	167
3. Did Not Want a Child ^a	27	15	7.5	—	27	19.5	12
4. Could Conceive But Did Not	128	125	123	121	7	5	3
5. Could Not Have a Live Birth	7	4	2	—	7	5	3
6. Wanted a Child	3	—	—	—	3	3	3
7. Did Not Want a Child ^a	4	4	2	—	4	2	—
8. Could Have a Live Birth	121	121	121	121	—	—	—
9. Conceived, But Had No Live Birth	60	42	23	4	56	37	18
10. Could Not Have a Live Birth ^a	18	—	—	—	18	18	18
11. Could Have Live Births Pregnancies Ended by :	42	42	23	4	38	19	—
12. Unintentional Wastage ^a	36	36	18	—	36	18	—
13. Illegal Abortion	6	6	5	4	2	1	—
14. Wanted a Child Did Not Want a Child ^a	2	2	1	0	2	1	—
15. Did Not Want a Child ^a	4	4	4	4	—	—	—
16. Total with No Live Birth	382	182	153.5	125	257	228.5	200
17. Per Cent of Total	100	47.6	40.2	32.7	67.3	59.8	52.4

¹ The high assumption is that the factor in question is decisive in cases of possible joint causation; the low assumption is that the other factor is decisive. The medium assumption is midway between the high and the low. The one couple whose first pregnancy was in process at interview is excluded.

² Fifteen of these couples practiced contraception "always" before they knew they were definitely sterile, because they did not want children.

³ These couples prevented conception by using contraceptives "always" or "usually."

⁴ Each of these couples wanted a child.

⁵ These couples prevented additional pregnancies by using contraceptives "always" or "usually."

either as childless from choice or from necessity, depending on whether high or low estimates are desired. (*See* line 7.)

Among the sixty couples who conceived but had no live birth there are eighteen who were told by their physician that it would be impossible to prevent subsequent pregnancies from ending in wastage. Each of these couples, therefore, should be classified as childless because of defects in the reproductive system. (*See* Table 11, line 10.) The sixty also include four who did not want children, terminated by illegal abortion the pregnancies which occurred, and prevented additional pregnancies by contraception. Each of these couples should be classified as childless because of control measures. (*See* Table 11, line 15.)

The remaining thirty-eight of the sixty couples whose pregnancies ended in wastage are more difficult to classify. It can be argued that (a) two should be classified as childless from choice, because they did not want their only pregnancy when it occurred and terminated it by illegal abortion, and (b) thirty-six should be classified as childless because of impaired fecundity, for if the reproductive system had functioned perfectly their pregnancies would have ended in live births. (*See* Table 11, lines 12 and 14.) On the other hand, it can be argued equally well that (c) the two couples should be classified as childless because of impaired fecundity, for after they had been married several years they wanted a child but could not have one because of premature menopause, and (d) the thirty-six couples should be classified as childless from choice, because they could have conceived again and had living children if they had not used contraceptives effectively. The procedures suggested in "a" and "d" give a high estimate of the importance of voluntary control and a low estimate for low fecundity; those suggested in "b" and "c" do the reverse. All are used accordingly.

Combining the foregoing statements in one way shows that if no attempts at controlling fertility had been made as many as 67.3 per cent of the 382 childless couples would still have been in that category. (*See* Table 11, line 17.) On this basis only

32.7 per cent were childless from choice. Another combination shows that if the reproductive system had functioned perfectly as many as 47.6 per cent of the 382 couples would still have been childless because of preventive measures, which leaves 52.4 per cent as a low estimate of the proportion childless because of impairments. Intermediate estimates, obtained by dividing equally the couples that could be subject to joint causation, are that 59.8 per cent of the childlessness was involuntary and 40.2 per cent voluntary.

On the basis of the previously-cited study of a group of childless women in New York City, Kiser estimated that 70-80 per cent of the childlessness among native-white wives in the group was involuntary.²⁶ Several factors may account for the greater importance of involuntary than of voluntary causes in that group than among the Indianapolis couples. First, the proportion of childlessness itself was relatively low in the New York group (an estimated 11 per cent as compared with 19.3 per cent for the Indianapolis group).²⁷ It is reasonable to expect that the lower this proportion the higher the ratio of involuntary to voluntary childlessness. Second, the New York group was not restricted to members of any religion or educational class

²⁶ Among 152 never-pregnant native-white wives in the New York Study 74 per cent reported that they had never practiced contraception, 62 per cent stated that they were disappointed in their childless condition, and 55 per cent declared that they had consulted a physician to ascertain the reasons for their childless condition. See Kiser, *op. cit.*, pp. 63 and 66.

NOTE: The New York Study included foreign-born white as well as native-white wives. The figures cited in this article, however, relate to native-whites since the Indianapolis group was restricted to native-white couples.

²⁷ Eleven per cent childless may seem too low for a group unselected with respect to education and religion. In his article, Kiser presented data indicating that the proportion would be about 50 per cent higher if, instead of relating to women under 50 and married 10 years or more, it related to women 40 years of age and over regardless of duration of marriage. "Judging from the Bushwick material, the total rate of childlessness among women under 50 and married 10 years or more is lower than a rate based upon wives 40 years of age and over, only as a result of differences in the age-at-marriage distributions. Within specific bridal ages no significant differences were found in rates of childlessness for the 2 types of populations. The dual restrictions with regard to maximum age of wife and minimum duration of marriage result in a subnormal representation of relatively late ages at marriage." (Kiser, *op. cit.* pp. 60-61.) By virtue of methods of selection, the ages at marriage of wives in the Indianapolis Study are somewhat lower than those for the New York group but this difference apparently is more than compensated by differences in other characteristics mentioned in the text.

whereas the Indianapolis group was limited to Protestants with at least an eighth grade education.²⁸ Third, the New York couples had been married at an earlier period (1900-1926) than the Indianapolis couples (1927-1929). The average duration of marriage probably was also longer for the New York couples than for the Indianapolis couples.²⁹

In view of the relation which is believed to exist between the extent of childlessness and the ratio of involuntary to voluntary causes it is desirable to supplement the foregoing comparison by making direct comparisons of the extent to which the two groups contained couples who were childless (a) because of control measures and (b) because of impaired fecundity. Wives who were childless because of control measures constitute between 6.3 and 7.8 per cent of all wives in the Indianapolis group and between 2.0 and 3.0 per cent in the New York group, the former being 2 to 4 times as large as the latter. In contrast, wives who were childless because of impairments constitute 10.1 to 10.3 per cent of all wives in the Indianapolis group and 8.0 to 9.0 per cent in the New York group, the former in this case being 1.1 to 2.3 percentage points above the latter. These differences (due to impairments) are smaller than those due to contraception and illegal abortion.

Indirect evidence indicates that the proportion of couples purposely preventing all pregnancies is higher in the Indianapolis group than in the New York group in part because of the differences in religion and educational attainment pointed out above.³⁰ The differences of 1.1 to 2.3 percentage points in the proportion of couples childless because of impaired fecundity might well be due to differences in sampling methods or to sampling errors. It is highly desirable that information on this

²⁸ Many studies have shown that fertility is lower (a) among Protestants than all other religious groups combined, and (b) among persons who finished at least the eighth grade than those who left school before reaching it. It would be expected that the lower fertility of these groups would be associated with higher proportions of childless couples.

²⁹ The New York group was limited to wives under 50 (in 1935-1936) and married at least ten years. The Indianapolis group was restricted to wives under 45 (in 1941) and married twelve to fifteen years.

³⁰ A later article in this series will analyze the relation between deliberate avoidance of pregnancy and educational attainment beyond the eighth grade.

matter be collected from other groups so that the situation of the population as a whole may be evaluated more accurately.

SUMMARY

The Indianapolis Study is one of the first in which information regarding the effect on family size of contraception, illegal abortion, and defects in the reproductive system was collected from a large sample of an important group of the population.

The experience of couples who were unable to have a first pregnancy, a second pregnancy, etc. and the number of months of uncontrolled exposure required for conception by couples who conceived during periods when contraceptives were not used, provide a basis for estimating the number of pregnancies and births that would have occurred in the absence of any control measures. This represents fecundity—the physiological capacity to reproduce. The estimate for all couples is 5,265 pregnancies and 4,594 births per 1,000 couples during the twelve to fifteen years from marriage to interview.

High, medium, and low estimates of *normal* fecundity are obtained by utilizing, respectively, the experience of the most fecund 60 per cent, 75 per cent, and 85 per cent of the couples. The differences between these estimates and those for all couples indicate that the average ability of all couples to bear children was at least 16 per cent and possibly as much as 41 per cent below the normal ability, because of defects in the reproductive system. The medium estimate is 27.4 per cent. The reduction is due mainly to the impairments which make it impossible for some couples to bear any children, or additional children, rather than to those which increase the time required to conceive by the couples who can do so.

A comparison of the actual fertility rate and the estimated reproductive capacity of the couples that appear normal (or above) in fecundity indicates the effect of voluntary control measures, namely, contraception and illegal abortion. High, medium, and low estimates of fecundity (based on 60, 75, and 85 per cent of the couples) show that voluntary control reduced the birth rate by 72.2, 67.2, and 64.4 per cent, respectively.

Contrasting the actual birth rate of all couples with that of couples who appear normal (or above) in fecundity indicates the extent to which defects in the reproductive system lower fertility with the actual practice of contraception and illegal abortion. High, medium, and low estimates of this reduction are, respectively, 21.3, 18.1, and 13.3 per cent.

The actual number of children is about 24.7 per cent smaller than the number the wives thought they would have had if they had been physiologically able to have all they desired. This estimate of the reduction due to impairments not only is higher than those just mentioned, but appears to be exaggerated. If it is reduced by 23.4 per cent (which appears necessary to eliminate the bias) it becomes 19 per cent, or slightly above the medium estimate. An intermediate estimate of the effect of low fecundity is yielded by comparing the birth rate of the couples classified as "relatively fecund" during the field work with the rate for all couples. The latter is 18.5 per cent below the former.

The discovery of methods of curing sterility and raising low fecundity would not increase the birth rate to the extent suggested by these percentages, for with present attitudes toward reproductive matters an important proportion of the couples with impairments would not take advantage of the curative treatments even if they were free.

An analysis of the information regarding the 382 couples with no live birth indicates that between 32.7 and 47.6 per cent were childless because of control measures and between 52.4 and 67.3 per cent because of impaired fecundity. Medium estimates are 40.2 and 59.8 per cent.

Wives who were childless because of sterility constitute only a slightly higher proportion of all wives among these Indianapolis couples than among the native-white wives in New York City studied by Kiser. In contrast, wives who were childless because of control measures constitute 2 to 4 times as large a proportion of all wives in the Indianapolis group as in the New York group.

APPENDIX

I. Estimating the Number of Couples that Would Have Had One or More Conceptions if Contraceptives Had Not Been Used, and Their Distribution by Months of Exposure Required for the First Conception

Of the 1,977 couples in the Study, 1,655 had one or more pregnancies. The first conception of 999 couples occurred when contraception was not being practiced, 525 having made no attempt at postponement, and 453 having discontinued preventive measures in order to have a child.¹ More than half of the wives in the first group conceived within $4\frac{1}{2}$ months of marriage (or of the time that they began intercourse with their future husbands if this preceded marriage), and more than three-fourths within twelve months.² (See Appendix Table A, Columns A and B.) The period of uncontrolled exposure necessary for the first conception averaged 11.4 months in length.

The 453 couples whose first pregnancy began while contraception was discontinued in order to have a child waited for various periods after marriage before trying to conceive. Nearly one-fourth stopped contraception during the first year and over one-fifth during the second, but nearly one-fourth waited until five or more years had passed. For the group as a whole the average length of this period was 39.8 months. Because of the delay it might be expected that longer periods of uncontrolled exposure were required for conception by this group than by the first. Instead, the reverse appears to be true. Over two-thirds of these couples reported that conception occurred within $4\frac{1}{2}$ months, and nearly seven-eighths that it occurred within twelve months. The average length of the period was 8.8 months. (See Appendix Table A, Columns C and D.)

It is possible, of course, that the shorter time required for conception by the second group than by the first is not real, but reflects biases in the data. In the first place there may be a tendency (a)

¹ For an explanation of what constitutes contraception see text, footnote 6. The first conception of twenty-one couples occurred when contraception was discontinued for reasons other than wanting a child (e.g. couldn't afford to buy contraceptives, thought themselves sterile).

² These fractions (and the average of 11.4 months which follows) are based on the distribution of 482 of the 525 wives, namely, those who reported length of exposure to the risk of conception before marriage as well as afterward. The forty-three wives from whom this information was not obtained were pregnant when married and probably conceived with less exposure than the 482. None of these couples used contraceptives before the first conception.

to understate the length of the period from the date when preventive measures were discontinued to the date when conception occurred, or (b) to fail to report long periods. The possibility of such bias has been suggested in discussions of similar situations found in other studies.³ Secondly, the length of the period between marriage and

Appendix Table A. Months of exposure without contraception required for first conception by (1) couples whose first conception occurred during such a period, and (2) other couples (estimated).¹

MONTHS OF EXPOSURE ²	COUPLES WHOSE FIRST CONCEPTION OCCURRED DURING A PERIOD						ESTIMATES FOR					
	Before Contraception Was Begun		When Contraception Was Discontinued in Order to Conceive		When Contraception Was Not Practiced ³		All Couples Who Conceived		Couples Who Did Not Conceive		All Couples	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
	A	B	C	D	E	F	G	H	I	J	K	L
1	140	29.0	177	39.1	320	33.5	554	33.5	44	13.6	598	30.2
2	48	10.0	63	13.9	113	11.8	196	11.8	16	4.8	211	10.7
3	42	8.7	45	9.9	89	9.3	154	9.3	11	3.4	165	8.4
4	26	5.4	21	4.6	47	4.9	81	4.9	5	1.6	87	4.4
5-6	40	8.3	44	9.7	84	8.8	145	8.8	11	3.4	156	7.9
7-9	40	8.3	18	4.0	60	6.3	104	6.3	4	1.4	108	5.5
10-12	52	10.8	27	6.0	83	8.7	144	8.7	7	2.1	150	7.6
13-24	35	7.3	17	3.8	54	5.6	94	5.6	4	1.3	98	4.9
25-48	36	7.5	22	4.9	62	6.5	107	6.5	5	1.7	113	5.7
49-84	7	1.5	8	1.8	17	1.8	29	1.8	15	4.6	44	2.2
85+	16	3.3	11	2.4	27	2.8	47	2.8	6	1.8	53	2.7
Not Reported ⁴	43	—	—	—	43	—	—	—	—	—	—	—
Can't Conceive	—	—	—	—	—	—	—	—	194	60.2	194	9.8
TOTAL	525	100.1	453	100.1	999	100.0	1,655	100.0	322	100.0	1,977	100.0

¹ See text for an explanation of the method of estimating.

² Because "months of exposure" was coded to the nearest whole number the line for 1 month includes periods of less than 1.50 months, that for 2 months includes periods of 1.50 to 2.50 months, that for 3 months includes periods of 2.51 to 3.49 months, etc.

³ Includes 21 couples whose 1st conception occurred during a period when contraception was discontinued for reasons other than wanting a child. (e.g. couldn't afford to buy contraceptives, thought themselves sterile, etc.).

⁴ Some of these wives stated that they were pregnant when married. The others presumably were, for they reported that the first pregnancy lasted nine months and terminated less than eight months after marriage. It is assumed in Columns B and F that the group is distributed like the wives reporting months of exposure.

⁵ Stix, Regine K. and Notestein, Frank W.: CONTROLLED FERTILITY, AN EVALUATION OF CLINIC SERVICE. Baltimore, The Williams and Wilkins Company, 1940, p. 68.

Beebe, Gilbert Wheeler: CONTRACEPTION AND FERTILITY IN THE SOUTHERN APPALACHIANS. Baltimore, The Williams and Wilkins Company, 1942, p. 65.

conception for couples who did not attempt to postpone the first child may be less than the estimate of 11.4 months because this estimate does not utilize the experience of the forty-three couples whose first conception occurred before marriage and who did not report the months of uncontrolled premarital exposure. Indirect evidence shows conclusively that if preventive measures are not used the average months of exposure prior to the first conception is less for wives who conceive before marriage than for those who conceive after marriage. However, this bias is offset in part (and may be more than offset) by the bias in the opposite direction resulting from the tendency for couples who were having intercourse without contraceptives before marriage to conceal from the interviewers the fact of such exposure.

On the other hand there are reasons for believing that some of the difference between the two groups with respect to months of exposure required for the first conception is real. The most important is the fact that couples who think it will be difficult or impossible for them to conceive are more likely than other couples to refrain from using contraceptives until after the first (or a later) pregnancy. As brought out in a previous report 74.2 per cent of the couples classified as "relatively fecund" but only 54.6 per cent of those classified as "relatively sterile" admitted attempts to postpone the first pregnancy.⁴ In consequence, "relatively sterile" couples constitute a higher proportion of the 525 couples whose first conception occurred before contraception was begun than of the 453 couples who stopped contraception in order to conceive, the percentages being 29 and 18 respectively.

In view of the foregoing it seems desirable to assume that the experience of the 956 couples whose first pregnancy began during uncontrolled exposure and who reported the months of such exposure may be used to represent that of the forty-three couples not reporting, and the 656 couples whose first conception occurred in spite of preventive efforts. More specifically, the assumption for the latter is that if contraceptives had not been used before the first pregnancy, or if their use had been discontinued before that event, the distribution of the 656 couples by months of uncontrolled exposure required for the first conception would be the same as that of the 956 couples.

⁴ Whelpton, P. K. and Kiser, C. V.: Social and Psychological Factors Affecting Fertility. VI. The Planning of Fertility. The Milbank Memorial Fund *Quarterly*, January, 1947, xxv, No. 1, p. 66. (Reprint p. 212.)

For an explanation of the terms "relatively fecund" and "relatively sterile" as used in this analysis see text, footnote 22.

Nearly 60 per cent would have conceived within 4½ months, 83 per cent would have done so within twelve months, and the average number of months of uncontrolled exposure required for the first conception would have been 10.3. (See Appendix Table A, Columns F, G, and H.)

The 322 couples who did not conceive may be considered in three groups: (a) The ninety couples that made no attempt to prevent the first pregnancy during the twelve to fifteen years from marriage to interview,⁵ and twelve couples who used contraceptives for a time, but later were told by a doctor that they never could have had a child. These 102 couples are classified as unable to have conceived unless treated successfully for sterility. (b) The ninety-three couples that tried to avoid pregnancy during certain periods of their married life but during other long periods discontinued contraception or practiced it only "sometimes." It is assumed that seventy-nine of these couples could not have conceived, and that fourteen would have conceived in from five to eight years if contraception had not been practiced for so long a time.⁶ (c) The 119 couples that practiced contraception regularly and successfully all of the time from marriage to interview, and the eight that did so for several years after marriage and until an operation was performed which made pregnancy im-

⁵ Only couples married twelve to fifteen years were included in the Study.

⁶ The ninety-three couples are subdivided in accordance with the length of the period during which contraception was discontinued or practiced only "sometimes," as shown below:

LENGTH OF PERIOD DURING WHICH CONTRACEPTION WAS NOT PRACTICED (Months)	PROPORTION OF COUPLES NOT CONCEIVING DURING SUCH A PERIOD WHO ARE ASSUMED		AVERAGE MONTHS OF EXPOSURE ASSUMED REQUIRED FOR COUPLES ASSUMED ABLE TO CONCEIVE
	Unable to Conceive (Per Cent)	Able to Conceive (Per Cent)	
0- 9.9	5	95	55
10-19.9	15	85	60
20-29.9	25	75	65
30-39.9	35	65	70
40-49.9	45	55	75
50-59.9	55	45	80
60-69.9	65	35	85
70-79.9	75	25	90
80-89.9	85	15	95
90-99.9	95	5	100
100 or More	100	0	—

possible. It is assumed that if these 127 couples had never tried to prevent pregnancy their experience would have been like that of the 513 couples who practiced contraception successfully for a shorter period and stopped to have a child. On this basis 114 would have succeeded, and thirteen would have found themselves unable to do so. Altogether, therefore, 194 of the 322 never pregnant couples are classified as unable to have conceived and 128 as able to have done so. (See Appendix Table A, Column I.)

When adequate weight is given to the different types of control-free experience among the 1,977 couples before the first pregnancy, it is found that there is a tendency for couples to cluster at two extremes. Approximately 30 per cent would have had their first conception in six weeks if contraception had not been practiced, and nearly 50 per cent in 3½ months. At the other extreme, approximately 10 per cent of the couples would never have been able to conceive and an additional 5 per cent would have required more than four years of uncontrolled exposure. (See Appendix Table A, Columns K and L.)⁷

II. Estimating the Number of Couples that Would Have Had Two or More Conceptions if Contraceptives Had Not Been Used, and Their Distribution by Months of Exposure Required for the Second Conception

These estimates are made like those for the first conception except for an allowance for the anovulatory period which is believed to continue after the puerperium in a large majority of cases, and during which conception cannot occur. If contraception is not practiced after the first puerperium the anovulatory period is part of the period of uncontrolled exposure. But if preventive measures are used for a time and then discontinued, the months without ovulation from the end of the puerperium to the discontinuance of contraception should be added to the subsequent period of uncontrolled exposure. It is assumed in this analysis that ovulation is resumed after pregnancy at the same time as menstruation.

Although 31 per cent of the couples studied did nothing to postpone or prevent the first conception, all but 13 per cent of those with one or more pregnancies began contraception when intercourse was resumed after the first pregnancy. Of the 213 couples who continued

⁷ In some cases, of course, the condition postponing or preventing conception could have been corrected by treatment or surgery.

to have uncontrolled exposure, over one-fourth conceived again within six months of the end of the first puerperium, over one-fifth during the next six months, and one-sixth during the second year, but nearly one-fifth could not have a second conception. On the whole the group consists of couples who did not conceive relatively soon after marriage. For example, 74 per cent of the couples whose first conception occurred in one month commenced preventive measures when that pregnancy ended. (See Appendix Table B, Columns B and C.) In contrast, only 39 per cent of those who did not try to postpone the first pregnancy but nevertheless did not conceive until sixteen or more months had elapsed, tried to postpone or prevent the second pregnancy. For this reason the couples whose second pregnancy began before the initial resort to contraception would be expected to require a longer period of exposure for the second conception than the couples whose second pregnancy began under other conditions.

The second conception of 351 couples occurred in a period when control measures were discontinued for that purpose. A few of these couples wanted the second as soon as possible after the first, usually because the first had ended in wastage. Over three-fourths of the

Appendix Table B. Couples whose first conception occurred before contraception was practiced, by months of exposure before first conception, and by resort to contraception at end of first puerperium.

MONTHS OF EXPOSURE BEFORE FIRST CONCEPTION ¹	ALL COUPLES	COUPLES BEGINNING CONTRACEPTION AT END OF FIRST PUERPERIUM		COUPLES NOT BEGINNING CONTRACEPTION AT END OF FIRST PUERPERIUM	
		Number	Per Cent of All Couples	Number	Per Cent of All Couples
	A	B	C	D	E
1	140 ²	102	74.5	35	25.5
2-3	90	58	64.4	32	35.6
4-7	83	45	54.2	38	45.8
8-15	92	46	50.0	46	50.0
16 or More	77	30	39.0	47	61.0
Not Reported	43 ³	28 ³	65.1	15 ³	34.9
TOTAL	525 ³	309	59.2	213	40.8

¹ Because "months of exposure" was coded to the nearest whole number the line for 1 month includes periods of less than 1.50 months, that for 2 months includes periods of 1.50 to 2.50 months, that for 3 months includes periods of 2.51 to 3.49 months, etc.

² Three of these couples became definitely sterile during the first puerperium.

³ These wives were pregnant when married.

group waited until at least a year had elapsed, and one-fourth waited more than four years. The delay apparently had little effect on the time required for conception once preventive measures were stopped, for more than half of the group conceived within six months (including the previous months of amenorrhea, if any, after the puerperium) and over 77 per cent within a year. (See Appendix Table C, Columns C and D.) The average length of the period for this group is 10.3 months, which is well below the corresponding figure of 17.5 months for the 174 couples that had not practiced contraception at any time before the second conception.

Appendix Table C. Months of exposure without contraception required for a second conception by (1) couples whose second conception occurred during such a period, and (2) other couples (estimated).¹

MONTHS OF EXPOSURE ²	COUPLES WHOSE SECOND CONCEPTION OCCURRED DURING A PERIOD						ESTIMATES FOR					
	Before Con- traception Was Begun		When Con- traception Was Discon- tinued in Order to Conceive		When Con- traception Was Not Practiced ³		All Couples Who Had a Second Conception		Couples Who Did Not Have a Second Conception		All Couples	
	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent
	A	B	C	D	E	F	G	H	I	J	K	L
1	4	2.3	49	14.0	56	10.2	119	10.2	50	6.1	169	8.5
2	10	5.7	46	13.1	56	10.2	119	10.2	48	5.9	167	8.5
3	10	5.7	26	7.4	37	6.8	79	6.8	29	3.6	108	5.5
4	11	6.3	32	9.1	45	8.2	96	8.2	35	4.3	131	6.6
5-6	23	13.2	36	10.3	66	12.0	141	12.0	40	5.0	181	9.2
7-9	20	11.5	56	16.0	76	13.9	162	13.9	61	7.6	223	11.3
10-12	28	16.1	27	7.7	56	10.2	119	10.2	33	4.0	152	7.7
13-16	22	12.6	28	8.0	54	9.9	115	9.8	35	4.3	150	7.6
17-24	12	6.9	16	4.6	31	5.7	66	5.7	20	2.5	86	4.4
25-48	16	9.2	26	7.4	42	7.7	89	7.6	34	4.2	123	6.2
49-84	16	9.2	4	1.1	22	4.0	47	4.1	36	4.4	83	4.2
85+	2	1.1	5	1.4	7	1.3	15	1.3	17	2.1	32	1.6
Can't Con- ceive	—	—	—	—	—	—	—	—	372	46.0	372	18.8
TOTAL	174	100.0	351	100.0	548	100.0	1,167	100.0	810	100.0	1,977	100.0

¹ See text for an explanation of the method of estimating.

² Because "months of exposure" was coded to the nearest whole number the line for 1 month includes periods of less than 1.50 months, that for 2 months includes periods of 1.50 to 2.50 months, that for 3 months includes periods of 2.51 to 3.49 months, etc.

³ Includes twenty-three couples whose second conception occurred during a period when contraception was discontinued for reasons other than wanting a child. (e.g. couldn't afford to buy contraceptives, thought themselves sterile, etc.)

In view of the foregoing it might be assumed that if contraception had not been practiced the 619 couples who conceived for the second time in spite of their efforts to the contrary would be distributed by time required for conception like the 351 couples who planned their second rather than like the 174 who let nature take its course. On the other hand, it is possible that conception cannot occur as readily during the first few weeks after menstruation is resumed following a pregnancy as it can later. If so, a period of exposure after the discontinuance of contraception should be increased by more than the preceding period of amenorrhea (after the puerperium) to make it the equivalent of the omission of any preventive efforts between pregnancies. Because of these conflicting possibilities the experience of all of the 548 couples whose second pregnancy began in a period when contraception was not practiced is used to represent that of the 1,167 couples having a second pregnancy.⁸

The next group to be considered consists of the 488 couples who had only one pregnancy. Seven of these couples became sterile at the end of the first pregnancy, and forty-five before many months had elapsed. Some of the latter did not use contraceptives after the first puerperium but others did even though conception probably was impossible because of diseased ovaries or other reasons. Each of these couples is classified as unable to have had a second conception.⁹ Another subgroup (sixty-one couples) practiced contraception for a time, and then stopped but did not conceive. Forty-eight of these couples either had a long period of uncontrolled exposure (over forty-four months) or became definitely sterile at the end of a shorter period. It is assumed that they would not have conceived a second time if no attempt at control had been made after the first pregnancy, but that the remaining thirteen would have done so. The months of uncontrolled exposure required for conception by each of the latter is as-

⁸ The second conception of twenty-three couples occurred during periods when contraception was discontinued for reasons other than the desire for a child.

⁹ This classification would be incorrect under certain conditions. For example, if a couple postponed the first pregnancy for several years, and if tumors were developing throughout this period and necessitated a hysterectomy shortly after parturition, it was impossible for the couple to have a second pregnancy at a later date, but two or more pregnancies would have been possible if no attempts at postponement had been made. No such situation is found among the fifty-two couples under consideration here. Instead, either (a) the first pregnancy was postponed for a period which is short in comparison to the period of uncontrolled exposure required for the first conception, or (b) sterility occurred primarily because of conditions associated with the first pregnancy rather than with the time elapsing from marriage to the first conception.

sumed to be approximately midway between the actual months of such exposure and 100.¹⁰

A large majority (over 76 per cent) of the 488 couples with only one pregnancy remain to be considered. Each of them practiced contraception for a long period—from the end of the first pregnancy to the interview (in most cases) or to the onset of definite sterility. The sixty "relatively sterile" couples in this subgroup are distributed primarily like the ninety-seven "relatively sterile" couples who stopped contraception to have a second pregnancy, thirty-six being classified as able to have conceived a second time, and twenty-four as unable to have done so. The 315 "relatively fecund" couples in the subgroup are distributed like all the 399 couples who stopped contraception to have a second pregnancy, 287 being classified as able to have conceived a second time and twenty-eight as unable to have done so.

The last group consists of the 322 couples with no pregnancy. The 194 classified as unable to have had a first pregnancy and sixteen of the twenty whose first pregnancy would have required more than five years of uncontrolled exposure are assumed unable to have had a second pregnancy. The remaining 112 couples classified as able to have had a first conception are assumed to be distributed with regard to a second like all couples with one or more. (*See Table C, I and J.*)

The tendency to cluster at the extremes, noted for the classification by months of uncontrolled exposure required for the first conception, is found again for the classification relating to the second conception. According to the foregoing estimates the second conception would have occurred within $3\frac{1}{2}$ months of the end of the first puerperium for over 22 per cent of the couples and during the next three months for about 16 per cent if contraception had not been practiced. At the other extreme nearly 19 per cent of the couples apparently could not have had a second pregnancy, and more than 5 per cent could have had it only after trying for more than four years. (*See Table C, Columns K and L.*)

III. Estimating the Number of Couples that Would Have Had Three or More Conceptions if Contraceptives Had Not Been Used, and Their Distribution by Months of Exposure Required for the Third Conception

Estimates for the third pregnancy are less satisfactory than those

¹⁰ This estimate and the division into the 2 classes were made on the basis of the table in footnote 6 of appendix.

for the first and second pregnancies because less than 30 per cent of the couples conceived for the third time, and less than 10 per cent did so during a period when contraception was not practiced. Since the latter group contains 186 couples, however, the information about them and about the 372 couples classified as unable to have had a second pregnancy is used as a basis for estimating what would happen to the remaining 1,419 couples. The procedure followed is the same as for the second conception, and involves the following steps: (a) It is assumed that the 392 couples whose third conception occurred in spite of preventive measures would have required the same number of months of uncontrolled exposure as the 186 couples who conceived during such a period. (b) The 589 couples who had only two pregnancies are divided into two groups, namely, the 473 assumed able to have conceived for the third time, and the 116 assumed unable to have done so either because of the onset of definite sterility or because of trying unsuccessfully for a third pregnancy during long periods. (c) The 473 couples mentioned in "b" are distributed primarily like the 114 whose third conception occurred after they stopped preventive measures because they wanted a child. (d) The 438 couples who had fewer than two pregnancies but are classified as able to have two are subdivided into two groups, namely, seventy-one couples assumed unable to have a third and 367 assumed able. The latter are distributed by months of exposure primarily like the 114 couples whose third conception occurred when contraception was stopped for that purpose.

The estimates thus obtained are given in Appendix Table D. They show 1,418 couples (nearly 72 per cent) able to have had a third pregnancy, and 559 (over 28 per cent) unable to have done so. Most of the former would have conceived relatively soon after the end of the second puerperium, for over 23 per cent of all the couples are in the group conceiving within $3\frac{1}{2}$ months, and over 27 per cent are in the group requiring $3\frac{1}{2}$ to $12\frac{1}{2}$ months. The average months of uncontrolled exposure per couple is 11.4.

The distribution of couples by the length of the period required for the third conception in the absence of preventive measures is much like that for the second except for an increase in the proportion classified as unable to conceive (from less than 19 per cent to more than 28 per cent). More than half of this increase of 10 percentage points comes from a decrease in the proportion requiring more than nine

MONTHS OF
EXPOSURE

1
2
3
4
5-6
7-9
10-12
13-16
17-24
25-48
49-84
85+
Can't
Con-
ceive
TOTAL

months to conceive; the remainder comes from a decrease in the seven to nine month group. The proportion classified as conceiving within $3\frac{1}{2}$ months is slightly higher for the third conception (23.1 per cent) than for the second (22.5 per cent). The estimated months of uncontrolled exposure required per couple conceiving averages less for the third (11.4 months) than for the second (13.9 months), which seems reasonable in view of the increase in the proportion of couples classified as unable to conceive.

Appendix Table D. Months of exposure without contraception required for third conception by (1) couples whose third conception occurred during such a period, and (2) other couples (estimated).¹

MONTHS OF EXPOSURE ²	COUPLES WHOSE THIRD CONCEPTION OCCURRED DURING A PERIOD						ESTIMATES FOR					
	Before Con- traception Was Begun		When Con- traception Was Discon- tinued in Order to Conceive		When Con- traception Was Not Practiced ³		All Couples Who Had a Third Conception		Couples Who Did Not Have a Third Conception		All Couples	
	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent	Num- ber	Per Cent
	A	B	C	D	E	F	G	H	I	J	K	L
1	1	1.8	17	14.9	24	12.9	75	12.9	121	8.6	196	9.9
2	5	8.8	13	11.4	18	9.7	56	9.7	90	6.4	146	7.4
3	—	—	12	10.5	12	6.5	37	6.5	78	5.6	115	5.8
4	1	1.8	10	8.8	13	7.0	41	7.0	68	4.9	109	5.5
5-6	10	17.5	16	14.0	30	16.1	93	16.1	119	8.5	213	10.8
7-9	3	5.3	12	10.5	15	8.1	47	8.1	83	5.9	129	6.5
10-12	4	7.0	7	6.1	12	6.5	37	6.5	51	3.7	88	4.5
13-16	12	21.1	7	6.1	19	10.2	59	10.2	59	4.2	118	6.0
17-24	10	17.5	8	7.0	19	10.2	59	10.2	66	4.7	125	6.3
25-48	9	15.8	10	8.8	20	10.8	59	10.2	80	5.7	139	7.0
49-84	—	—	2	1.8	2	1.1	9	1.6	23	1.7	32	1.6
85+	2	3.5	—	—	2	1.1	6	1.1	2	0.2	8	0.4
Can't Con- ceive	—	—	—	—	—	—	—	—	559	39.9	559	28.3
TOTAL	57	100.0	114	100.0	186	100.0	578	100.0	1,399	100.0	1,977	100.0

¹ See text for an explanation of the method of estimating.

² Because "months of exposure" was coded to the nearest whole number the line for 1 month includes periods of less than 1.50 months, that for 2 months includes periods of 1.50 to 2.50 months, that for 3 months includes periods of 2.51 to 3.49 months, etc.

³ Includes fifteen couples whose third conception occurred during a period when contraception was discontinued for reasons other than wanting a child. (e.g. couldn't afford to buy contraceptives, thought themselves sterile, etc.)

IV. Estimating the Average Number of Months of Uncontrolled Exposure Required for the Fourth and Subsequent Conceptions by Couples that Would Have Had These Conceptions if Contraceptives Had Not Been Used

Although 257 couples had a fourth pregnancy, only fifty-eight of these conceptions occurred in a period when contraception was not practiced. The average duration of uncontrolled exposure for the fifty-eight couples is 8.8 months, which is well below the corresponding figures of 12.0 months for the 186 third conceptions and 12.7 months for the 548 second conceptions which occurred during such periods. Because the decrease is so large and the number of cases so small it is believed advisable to base the time required for the fourth conception on the relation between the estimates for the second and third conceptions rather than on the experience of the fifty-eight couples.

The average months of uncontrolled exposure required for the second and third conceptions by couples classified as able to have had these conceptions is estimated as 13.94 months and 11.42 months, respectively, in Sections II and III. The latter figure is 81.9 per cent of the former. It is assumed that similar relationships but with rising percentages hold between subsequent conceptions. Specifically, the period of uncontrolled exposure required for the fourth conception by couples able to have had a fourth conception is assumed to be 85 per cent as long as that for the third conception. The corresponding assumptions for subsequent conceptions are 88 per cent for the fifth, 91 per cent for the sixth, 94 per cent for the seventh, 96 per cent for the eighth, 98 per cent for the ninth and 100 per cent for the tenth. The resulting durations are 9.7 months for the fourth conception, 8.5 for the fifth, 7.8 for the sixth, 7.3 for the seventh, 7.0 for the eighth, and 6.9 for the ninth and subsequent conceptions. (See Table 5, Column A.) Since all couples classified as able to have a fourth or subsequent pregnancy are assumed to be of normal fecundity for purposes of the low and medium estimates, the foregoing averages are used for the 1,680 and the 1,483 couples. (See Table 5, Columns C and E.) In obtaining the maximum estimate the same figures are used for the fifth and subsequent pregnancies (for the same reason) and the figure for the fourth conception (7.4 months) is estimated by interpolation. (See Table 5, Column G.)

ORDER OF
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Although the foregoing assumptions regarding the decrease in the length of the period required for conception in the absence of preventive measures after the third pregnancy are arbitrary, some reduction seems called for because of the transfer of couples from the "able to conceive" category to the "unable" category. It is probable that the proportion of "slow breeders" who become unable to conceive exceeds the corresponding figure for the "rapid breeders."

V. Estimating the Fecundity of the "Relatively Fecund" and "Relatively Sterile" Couples, and the Reduction in Fertility Due to Control Measures

As mentioned in Section A it is not feasible to array the couples from most fecund to most sterile, and estimate what the reproductive performance of the upper 60, 75, or 85 per cent would have been if no contraceptives had been used and no pregnancies terminated illegally. It is feasible, however, to prepare such estimates for the 1,444 couples classified as "relatively fecund" and the 533 couples classified as "relatively sterile" when the field work was in progress.

The numbers of couples able to have a first, second, and third pregnancy and the number of months of uncontrolled exposure required for each conception are estimated for each of these groups according

Appendix Table E. Ability to conceive and months required for conception and pregnancy, by order of pregnancy, for "relatively fecund" and "relatively sterile" couples.¹

ORDER OF PREGNANCY	1,444 "RELATIVELY FECUND" COUPLES				533 "RELATIVELY STERILE" COUPLES			
	Number of Couples Able to Conceive	Months Required for			Number of Couples Able to Conceive	Months Required for		
		Con-ception	Preg-nancy	Cumula-tive Total		Con-ception	Preg-nancy	Cumula-tive Total
A	B	C	D	E	F	G	H	
1	1,432	7.4	9.6	17.0	351	24.5	8.9	33.5
2	1,392	11.2	9.5	37.7	213	31.6	8.7	73.7
3	1,311	10.6	9.1	57.4	108	21.4	8.2	103.4
4	1,213	10.1	9.3	76.8	64	16.3	8.2	127.9
5	1,114	9.8	9.1	95.7	35	13.5	8.0	149.4
6	1,013	9.5	9.1	114.3	21	12.0	8.0	169.4
7	921	9.4	9.1	132.8	9	11.3	8.0	188.7
8	838	9.4	9.1	151.3	0			
9	754	9.4	9.1	169.8				

¹ See text for an explanation of the method of estimating. Columns C and G include one month for the puerperium.

to the procedure described for all couples in Sections I, II, and III of the Appendix, using the data in Appendix Tables A, C, and D.

The procedure for the fourth and subsequent pregnancies involves assumptions. Because the "relatively fecund" couples constitute 80.3 per cent of all the couples classified as able to have a first pregnancy, and 86.7 and 92.4 per cent, respectively, of those able to have second and third pregnancies, it is assumed that the corresponding percentages are 95, 97, 98 and 99 for the fourth to seventh pregnancies, and 100 for the eighth and subsequent pregnancies. The resulting numbers of couples classified as able or unable to conceive are shown in Appendix Table E, Columns A and E.

The assumptions regarding months of uncontrolled exposure required for conception follow the same principles as those for all couples. Among the "relatively fecund" couples this period is 94.5 per cent as long for the third pregnancy as for the second; among the "relatively sterile" couples the percentage is 67.8. The corresponding percentages for successive pairs of pregnancies are assumed to be 95.5, 96.5, 97.5, 98.5, 99.5, and 100 for the "relatively fecund" couples and 76, 83, 89, and 94, for the "relatively sterile" couples. The resulting durations are shown in Appendix Table E, Columns B and F.

The average length of each pregnancy (shown in Columns C and G) is computed from distributions for each group like those for all couples in Table 3. Similarly, the ratio of live births to pregnancies, by order of pregnancy, is computed from the data regarding termination of pregnancy, on which Table 4 is based. The average number of months married is assumed to be 157.3 for each group.¹¹

Combining the foregoing information gives a total of 9,478 pregnancies for the "relatively fecund" and 778 for the "relatively sterile" couples if there had been no contraception or illegal abortion.¹² The

¹¹ This is the average for the 1,977 couples. The actual average for the "relatively fecund" couples is 157.27 months, and for the "relatively sterile" couples 157.47 months. In contrast to the procedure followed in Table 14 of the sixth article in this series, periods of sterility and of separation when not pregnant have been included in computing these averages.

¹² The average experience of the 1,444 "relatively fecund" couples shows that the eighth pregnancy could have been completed 151.3 months after marriage. (See Appendix Table E, Column D.) In other words, each of the couples on the first 8 lines of Column A could have had the pregnancies specified, which total 9,233. Subtracting 151.3 from 157.3 (the months married) leaves an average of 6.0 months for a ninth pregnancy. Pooling this for the 754 couples classified as able to have a ninth pregnancy, and dividing by 18.4 months (the average time required for the ninth conception and pregnancy) gives 245 ninth pregnancies. Adding 9,233 and 245 gives 9,478.

rates per 1,000 couples are 6,564 and 1,460, respectively. Applying the ratios of live births to pregnancies gives birth rates of 5,861 and 1,105.¹³ The criteria used in the field classification, therefore, give a group of "relatively sterile" couples whose ability to conceive and ability to produce living children are, respectively, 22.2 per cent and 18.8 per cent of those of the "relatively fecund" couples.

Combining the estimates for the 2 groups gives totals of 10,256 pregnancies and 9,051 births, and rates of 5,188 pregnancies and 4,578 births per 1,000 couples. These rates are slightly below the rates of 5,265 pregnancies and 4,594 births shown for the 1,977 couples in Table 6, Column A. The differences result primarily from differences in the estimated months of uncontrolled exposure required for conception, for the numbers of "relatively fecund" and "relatively sterile" couples classified as physiologically able to have a pregnancy of each order are obtained by subdividing the total numbers so classified. The length of the periods required for conception, however, is computed and estimated independently for all couples, the "relatively fecund" and the "relatively sterile" couples. In view of this fact differences of less than 2 per cent in the final rates are not surprising.

The rates for the 1,444 "relatively fecund" couples—6,564 pregnancies and 5,861 births—are slightly over 7.0 per cent below the corresponding rates of 7,076 and 6,325 for the 1,483 couples constituting the most fecund 75 per cent of each array. (See Table 6, Column C.) The difference is due primarily to the fact that the rates for the 1,444 couples are based on the experience of an identical group of couples from marriage to interview, whereas those for the 1,483 couples represent the composite experience of the upper 75 per cent of the couples in each array (time required for each conception, and ability to carry to term and produce a living child).

The actual pregnancy and birth rates of the 1,444 "relatively fecund" couples are 2,239 and 2,023 per 1,000.¹⁴ These are 34.1 and

¹³ The number of live births per 100 pregnancies (excluding pregnancies terminated by illegal abortion or in progress at the time of the interview) is as follows:

	FIRST PREGNANCY	SECOND PREGNANCY	THIRD PREGNANCY	FOURTH AND SUBSEQUENT PREGNANCIES
"Relatively fecund" couples	93.5	93.1	87.1	87.7
"Relatively sterile" couples	81.2	80.3	63.8	60.0

¹⁴ See reference 19 of the text.

34.5, respectively, of the foregoing rates which assume no contraception or illegal abortion. In other words, these estimates indicate that the deliberate efforts to restrict fertility which were made by these couples reduced their pregnancy rate by 65.9 per cent and their birth rate by 65.5 per cent. These reductions are somewhat smaller than those of 70.4 shown in a previous article, but should be more accurate because of the more rigorous procedure followed here.¹⁵

The actual pregnancy and birth rates of the 533 "relatively sterile" couples are 1,118 and 820 per 1,000. The estimates presented above indicate that these couples would have had rates of 1,460 and 1,105 if contraception had not been practiced and no pregnancies terminated illegally. It appears, therefore, that even though these couples had serious defects in their reproductive systems their attempts to postpone or prevent unwanted pregnancies reduced their fertility rates by between 23.4 and 25.8 per cent.

¹⁵ *Ibid.*

ANNOTATIONS

EUROPE'S POPULATION IN THE INTERWAR YEARS

THIS volume by Dudley Kirk¹ is the last in a series of four² studies sponsored by the League of Nations and carried out by staff and collaborators of the Office of Population Research at Princeton University, under the general direction of Frank Notestein. Kirk's work is the most ambitious in scope and design of the four. He views Europe as a unit, to be broken down for purposes of analysis into regional subgroups transcending national boundaries. His analysis is focussed on "the most important resource of any nation or of any continent, its people." He relates the shifting pattern of this resource, historically and geographically, to variations in economic and political structure and in social heritage.

The study has several objectives: (1) to present "what might be regarded as a census of Europe, covering much of the materials normally included in national censuses without their very great numerical detail"; (2) to achieve complete coverage by supplementing official data with estimates from official, semi-official and private sources; (3) to break down the data for delineation of economic and cultural boundaries which may be at least as significant as the political boundary lines "arbitrarily fixed by man"; (4) to present the data in a form where the patterning of details can be grasped most readily and economically, and (5) to indicate the significance of empirical findings in a "logical structure."

¹ Kirk, Dudley: *EUROPE'S POPULATION IN THE INTERWAR YEARS*. Geneva, League of Nations, 1946, 340 pp.

² The three preceding volumes in the series are: *THE FUTURE POPULATION OF EUROPE AND THE SOVIET UNION: POPULATION PROJECTIONS 1940-1970*, published in 1944, *ECONOMIC DEMOGRAPHY OF EASTERN AND SOUTHERN EUROPE*, published in 1945, and *THE POPULATION OF THE SOVIET UNION: HISTORY AND PROSPECTS*, published in 1946.

Kirk has been remarkably successful in achieving these objectives. As the title of the book suggests, he concentrates on the interwar period, the only span of years for which comprehensive and comparable data could be assembled "to show the more underlying and enduring aspects of Europe's human resources, aspects that do not change overnight and which have effectively survived war and conflict." Even for this limited and relatively recent period, the matter of assembling and collating data was a difficult task, complicated by the facts that the basic census data were originally collected at different times for twenty-nine different national purposes in twenty-five different languages, that regional subdivision involved classification by some 600 administrative districts, that there was little consistency or comparability in many important definitions (*e.g.*, urban and rural, occupational classes), or in such apparently straightforward matters as decisions as to what people should be counted in a census, and that estimates to supply missing data had often to be made on insecure bases.

The first seven chapters are arranged according to orthodox demographic practice: Population Distribution, Population Change, The Balance of Births and Deaths, Overseas Migration, International Migration within Europe, Internal Migration, and The Balance of Migration and Migration as a Factor in Population Growth. The next two chapters systematize materials on Social and Economic Development (health, literacy, occupational structure, and economic productivity in agriculture) and on Ethnic Diversity (criteria of nationality and language), while the final chapter pulls together all of the materials for an overall picture of "Europe's Population in a Changing World." The conclusions in this final chapter are founded firmly on the preceding orderly empirical analyses. The conditioning of the continental pattern of population distribution by socio-economic developments, against which national boundaries served as ineffective barriers, has been analyzed in detail. The concept of the vital revolution as a variable dependent upon the preceding agricultural and industrial revolutions is developed skillfully. Kirk lays particular emphasis on contrasts in the socio-psychological forces underlying the control of death and the control of birth. Both have resulted in downward

trends closely correlated with the rising level of living of industrialized populations. But, whereas the saving of life is in peace time a universal value, the means by which births are controlled (abortion and contraception) "flaunt and defy very deeply rooted mores," often run counter to nationalistic objectives and require strong personal motivation. Kirk emphasizes, too, the role of the modern European state in facilitating mortality control, which it has achieved, in large measure, without even the active cooperation of the individuals concerned. "No earlier form of government can compare with it as a provider of public safety, as a guardian against epidemic and disease and in its interest in the general education and material welfare of its citizens." Hence, reductions in mortality have tended to occur in an orderly manner, following the progress made in productive techniques, the rise in the level of living, and advances in medical science. The fall in the birth rate has been more erratic. Its spread is to be attributed not only to the same socio-economic and scientific trends which have affected the death rate, but also to the permeation of "new attitudes [unfavorable] towards the reckless creation of human life," and to the inconveniences of large families in modern society. Pronatalist policies designed to curb the decline in births, whether through repressive, meliorative or propagandistic means have met with some success but "may well have a self-limiting aspect, in that they tend to reinforce and disseminate certain of the values that originally produced fertility decline (as, for example, the rising level of economic aspiration)."

The third factor affecting population change in Europe—migration—has tended to lose its earlier character of a mass movement "ebbing and flowing with opportunity abroad and crises at home," for although crises "at home" persist, and have been accentuated by the backing up of displaced people, "opportunities" abroad have either dried up or been surrounded by the barriers of governmental restriction. Even internal migration has not been free from governmental restriction, and "should the internal distribution of the population become a matter of paramount military importance it seems likely that internal migration, too, will be increasingly guided by national rather than by personal considerations."

The deviant position of Soviet Russia and Eastern Europe generally, from the patterning of population that followed the course of the vital revolution in Western and Northern Europe is considered although, in this connection, the companion volume by Frank Lorimer should be consulted for greater detail. Kirk concludes "that the countries of this region will be able to close up some of the more obvious gaps between this region and the West in the coming years," since "they are at the stage of development in which the cheap gains are to be made," particularly in respect to saving of lives, and since efforts towards rapid industrialization which precede the vital revolution "swim with the strongest of social trends."

In summary, the excellence of Kirk's study derives chiefly from the skillful organization of masses of empirical data around important sociological concepts. The data are handled with methodological sophistication. The book is exceptionally well-written. The charts and maps, beautifully executed by Daphne Notestein, not only supplement but at times supplant the text.

The book suffers from a few minor defects. A technical appendix, in which the reliability of data and estimates was more thoroughly discussed, would have enhanced the value of the volume for other investigators. In spite of the lavish use of chapter subheadings, an index should have been included. And the several "identification" maps which are presented without either alphabetical key or diacritical marks do not serve the purpose of "identifying" place names very efficiently.

DOROTHY SWAINE THOMAS

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NUTRITION IN HEALTH AND DISEASE¹

THIS new and thoroughly revised edition of a book on nutrition which has an established place as a textbook should be warmly welcomed by many old and new students of the subject. The rapid growth in the science of nutrition has required the authors to make frequent revisions and this tenth edition since

¹ Cooper, Lenna F.; Barber, Edith M.; and Mitchell, Helen S.: *NUTRITION IN HEALTH AND DISEASE*. J. B. Lippincott Company, 1947, Tenth Edition, 729 pages.

1928 includes much new material, discusses the newer findings on deficiency diseases and the interrelationship of other diseases and malnutrition, and gives the most up-to-date data on the nutrient content of foods.

As *NUTRITION IN HEALTH AND DISEASE* is designed primarily as a textbook for nurses, the authors have presented many different aspects of diet and nutrition in readable and nontechnical language. Chemical terms are defined and formulae for the vitamins, etc. are not given. The scope of the book is suggested by the titles of the four parts into which it is divided: Part I, Principles of Nutrition, 215 pages; Part II, Diet in Disease, 173 pages; Part III, Food Selection and Preparation, 178 pages; and Part IV, Tabular Material and Special Tests.

Not only nurses but homemakers and others interested in understanding nutritional needs and the physiological aspects of nutrition will find this book an excellent introduction to the subject. It is also a useful handbook for planning meals for any purpose, from meals for the healthy of any age to therapeutic diets for the sick. Many recipes are given as well as advice on methods of cooking and on the handling and storage of foods. The discussion of the relation of diet to specific diseases is unusually complete. An excellent index facilitates use of the book for reference.

DOROTHY G. WIEHL

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THE APPLICATION OF EXPERIENCE IN ANIMAL HUSBANDRY TO THE PROBLEMS OF HUMAN REPRODUCTION

OUR knowledge of the physiology of human reproduction and of the biochemical factors controlling it is still fragmentary. The National Committee on Maternal Health, recognizing that valuable research on the fertility of mammals has been going on for many years in the field of animal husbandry, invited a group of experimental biologists with special experience in this field to meet with interested physicians early in 1946, and to present to them some of the results of recent

research in mammalian fertility. *THE PROBLEM OF FERTILITY*¹ presents the papers read at this conference and the discussions which followed each paper.

The symposium covers the fields of ovulation and sperm production; the known endocrine factors in mammalian fertility; and the metabolism of spermatozoa and ova.

Three of the papers deal with clinical research on small numbers of human beings. The remainder are concerned with various aspects of the fertility of domestic animals. The application of much of the information on domestic animals to the problems of human fertility is remote because of basic differences in reproductive physiology. It is important, however, that physicians and physiologists working in the field of human fertility should be conversant with what is being done in related fields of mammalian physiology.

The comprehensive bibliographies following each paper should be invaluable to research workers.

REGINE K. STIX, M.D.

¹ Engle, Earl T. ed.—*THE PROBLEM OF FERTILITY*, Proceedings of the Conference on Fertility held under the auspices of the National Committee on Maternal Health. Princeton, N. J., Princeton University Press. 1946. 254 pp. \$3.75.

